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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

Looking Ahead Policy—The Big Industrial Load.

THE more one looks into the question of a gas-business developing policy for the future, the more items one finds which should be incorporated in it. In previous articles, we have referred, among other matters, to the policy of concentrating gas production for larger areas by the process of amalgamation and supply in bulk; incidentally also has been discussed the subject of tariffs in the gas industry. The point has been raised as to whether the time has not come when we should seriously consider the revision of our methods of charging for gas in order to establish something which in itself would be an incentive to increased gas consumption, and would put gas on a parity with electricity in respect of price allurement—but an allurement with good value in it. That is an important matter in connection with future development. The gas industry has gone along wearing the old-fashioned price-charging habiliments, while our chief competitor has adopted new modes which are more attractive in the domestic realms than the old and have done something to boost its commodity despite the lower values it offers than gas to the purchaser. Price is a large factor in trading of all descriptions. Of that the gas industry needs no persuasion. It is ever looking out for ways and means to bring down its charges, and always full of regrets when they have to ascend. The sliding-scale companies especially have cause for regret when this happens. But the great point is, Do our present price methods give us sufficient elasticity in the face of severe competition at prices and by methods which show a remarkable latitude? Several gas men admit they do not; a great number of salesmen who come into contact with the consumers assert the same thing. The opinions of specialist gas salesmen are valuable in this connection; and we are pleased to find the matter had such strong emphasis at the recent meeting of the Industrial Gas Circle at Sheffield, the first part of the report of which was published in the "GAS SALESMAN" last week, and which will be concluded in next week's issue of that paper.

It is the part of the report still to be published which has special interest for us in relation to this item of future policy. Before dealing with it, however, let it be said that the Sheffield Gas Company need no spurring-up in this regard. We know this of old; and the remarks at the meeting of the Circle by the Chairman of the Company (Col. H. K. Stephenson) and the General Manager (Mr. Ralph Halkett) accentuate the knowledge. The Company do a large industrial business; and Mr. Halkett rightly says that, by assisting the industries of Sheffield to secure a reliable heating agent, they are helping themselves. The Company have a comprehensive system for dealing with this industrial business; and one of the elements in it is a charge of 4d. per therm for industrial gas. The gas business is consequently flourishing in the industries of the city, despite the low prices per unit of electricity. Only a few electric furnaces are in use, though there have been strenuous efforts to get them adopted. Eloquent of preference is the fact that over sixty new industrial gas-furnaces were fixed last year; and the Company converted to gas a large number of coal-fired furnaces. It is coal, not electricity, that is the greatest rival of gas in industrial heating processes.

Leaving what the Sheffield Company are already doing for industry, it is the paper by, and views of, Mr. F. T. Rennison, the Superintendent of the Industrial Department of the Company, which have particularly arrested our attention in connection with the consideration which is being currently given to the construction of a developing policy in the gas industry. One of the reasons advanced for the Government electricity scheme is the need for helping industry; and industry is not in the least excited, because it cannot see that carrying cables into rural areas is going to cheapen electrical energy for the big concentrations of industry which are being well served by existing stations. Industry wants cheap heat as well as cheap power—and more so as things are; and there is nobody who knows this better than a man, like Mr. Rennison, whose business it is to develop the application of gas heating to manufacturing work. We will pass over all he had to say in his paper regarding the convenience, flexibility, and other merits of gas for heating in industrial operations, and the descriptions of local work by which he imparted great interest to the members of the Circle. He has his eye on the larger heating operations; and there is no question that he is convinced that the present system of charging for gas on a sliding-scale basis, with differences according to quantity, does not offer the best possible encouragement to use for all purposes. Remember we are considering the views of a specialist who works for a Gas Company among some of the most advanced industrialists in the world; and he admires and defends what the electricity industry has done in the matter of adapting its tariffs to industrial needs. He points to the futility of adversely criticizing the electricity industry for the wide differences between the charges to lighting consumers and to industrialists with large continuous loads. The test of propriety is the overall result. But here we have gas undertakings with the "goods to deliver," and yet Mr. Rennison is able to accuse them of having given little or no thought to the question of tariffs. Their flat-rate system of charging, with rebates for advancing volumes, has been so firmly established that not even competition on a more elastic basis has awakened the general run of gas practitioners to inquire whether the permanence of their method of charging is an advantage or otherwise in these days of keen competition. We repeat what has been said in the "JOURNAL" many times—methods should (to the necessary extent) change with the times and with requirement.

Hence the plea that Mr. Rennison makes for the gas industry to ignore the past and look well ahead, and, if found desirable, to revise the existing system of charging for gas in relation to the present and future possibilities of each class of consumer. In other words, what is wanted is a tariff which will encourage the large consumer, and at the same time charge each class in proportion to the cost of the service. This looks like a two-part tariff—a service charge, and a low cost per therm for all consumption whatever the use. That is the suggestion; and, in connection with it, we cannot overlook the special experience of the author of the paper, and the points he submits in support. They constitute an indictment which requires to be examined in detail in order to test its validity. "If," said Mr. Rennison, "the cost per consumer under the present system of charging were carefully analyzed in all industrial areas, the result in every case, I think, would prove that the domestic consumer is undercharged and the industrial consumer overcharged. If this

is so, such a system must restrict the free use of gas for industrial operations and react against the best interests of the industry" We are persuaded that he is right; and he makes out a good case—suggestive and argumentative, and not dogmatic. He wants a method of charging to be devised which will attract larger custom, which will keep gas-works running under an improved load factor, and the existing network of mains better employed in its proper function of distributing gas, instead of storing it, for the greater part of the day. The industrial load is substantially a day load, is regular all the year round, is unaffected by seasons or climatic conditions, is not subject to violent peaks, the consumption is large per consumer, the service cost so low in relation to consumption that it can be ignored, and the cost for stand-by plant is negligible, because the actual consumption almost equals the maximum demand. It cannot be gainsaid that such consumption is highly desirable.

More and more investigation is being made into the ways and means of developing the gas business along lines which will safeguard the interests of the industry in the face of competition. Those lines must be drawn in a bold manner. If the ways of the past will not promote development in valuable directions, and are not now sufficiently protective, then they must be altered. Trading practices must be made to fit new conditions; for there is little use trying to make requirement and competition (which are not under our control) fit our practices. There is plenty of fresh business to be obtained, and large areas of virgin territory to be cultivated. How is that business to be realized? How is the new territory to be annexed and developed? The future claims consideration for these questions; and a broad view and a long view, combined with initiative, will supply the answers. Mr. Rennison's paper fits in well with the plea we have lately been making for a definite looking-forward policy in the gas industry.

The Gas Essay Competition.

The stupendous task of judging some 11,000 essays of about 1400 words apiece has at last been completed; and we have pleasure in publishing on another page the official list of the first 115 prizes awarded by the "B.C.G.A." It may be remembered that the original offer of the Association was of 93 prizes, aggregating £1200. In view, first of the number, and secondly—and mainly—of the quality, of essays sent in, the Association decided—very properly and wisely we think—to increase the substantial prizes (of £5 and upwards) from 93 worth £1200, to 115 worth £1395, and to add another 100 prizes of £1 1s. each and about 800 "consolation" prizes of the value of about £200—making £1700 in all. By so doing the "B.C.G.A." have achieved two desirable objects—spread the distribution of their prizes far and wide over the whole British Isles; and shown their appreciation of the excellent work put into the essays by so many of the competitors, who studied and were enthused by the case for the gas industry as a valuable servant to the housewife, the artisan, the manufacturer, the city, and the nation.

Many of those who have acted as Judges of this great volume of essays have told us that, in their opinion, no finer or more timely scheme for gas propaganda has been devised; and that the fact that there are no less than 11,000 thoroughly convinced and well-informed advocates of gas as a great public servant among the intelligent classes throughout the British Isles, is one worth ten times the amount spent on the campaign. One has only to glance through the list of prize winners to see the class of entrant for this competition. We congratulate the Association very heartily upon this very *apropos* addition to their services to the industry, and express our thanks to those who carried through the really onerous and responsible task of judging the essays. We shall print next week the two which were bracketed first by the Committee of Judges. It will be noted that one is a graduate of Glasgow University and the other a citizen of County Cork. The "Celtic fringe" scores again! But the Scot is to be found, as usual, a long way South of the Border. Well, it's a good "cosmopolitan" list, anyway; and we are sure the gas industry will be well pleased with it.

The Industry's Conversion.

When we come to survey the affairs of the gas industry from the platform of to-day, and reflect, it is interesting to note how the change of circumstances is forcing the acceptance, to common advantage, of methods which for a long period were regarded by many as works of supererogation. Time was when in the gas industry it was not considered necessary deliberately to do anything to improve the quality of the secondary products with the view of making them more valuable, and therefore more acceptable, to purchasers. Work in connection with quality was confined to the primary product, and that to a large extent only because there was statutory decree which compelled the attention. Several years ago Dr. Charles Carpenter preached the gospel of improvement of all products, as supplying the means of protecting the primary product, and therefore the consumers of gas, by ensuring the maintenance of demand, with increasing production, for the secondary commodities. In those days the President of the South Metropolitan Company was privately, if not openly, described by those who did not agree with him as a visionary; his counsel as that of unnecessary perfection. Nobody says those things to-day; and the majority of men in the industry know there was truth and foresight in both advocacy and practice. People smiled when the Company established a laboratory in Newcastle for the purpose of ascertaining that the coals purchased were of the condition and quality that were paid for. Since that laboratory was established, Dr. Carpenter has had to complain of the ash in coal and of other inferior conditions. The laboratory has been helpful, though perhaps not altogether successful, in preventing the passage between Newcastle and London of coal more uncleanly than the Company desired. Circumstances at the collieries have not been altogether favourable to insistence; and tides and gas demand stay for no man's convenience. Nevertheless, much good has resulted from the Company's technical representation in Newcastle, though not all that was hoped for. To-day all thoughtful men in the industry are talking of coke improvement. Many years ago the Company established chemical and physical laboratories at Old Kent Road, which have rendered remarkable service in connection with works control, improvement in the whole range of products, and in promoting correct conditions for the utilization of the primary products. It is years ago since we saw at Old Kent Road sulphate of ammonia in a physical and chemical condition which to-day has to be common practice, or our chief buyers will not have the material.

The mistake the gas industry made in the past was due to a shortness of vision in not appreciating that, in every sphere in which it operates, competitors would make progress and bring about more stringent conditions; also that with time the knowledge of requirement and suitability would grow among purchasers, with the inevitable result that demand by them, and not the traditional practices of the gas industry, would rule in the fortunes of the latter. That is the position to-day. We have now to ask ourselves, What do our customers require, no matter whether the commodity be gas, coke, tar, or sulphate of ammonia? What they require is what we have to supply, or go under. The electricity industry is putting forth its full strength with the view of improving its position; we have to put forward ours to see that our position is not damaged, and that progress is not dammed by their efforts. In order to do this, we have also to do all possible with the ideal before us of making our secondary products sought after—not having to be hawked round to secure custom. In his address to the proprietors of the South Metropolitan Company last Wednesday, Dr. Carpenter emphasized these matters. He referred to the satisfactory sign of the times that, throughout the country, increased attention is being given to the science of coke production; and we venture to think that the part the "Journal" took last year (through the assistance of a well-known enterprising firm) did much to give a fillip to interest and action in this direction. Dr. Carpenter states that his Company's research department continues to be busily engaged upon the problem; and he adds: "Whatever may be the needs of "the domestic consumer in the matter of smokeless fuel "(and, I think, in this respect it is largely a question of "the right type of fireplace), it is certain that for manu-

"facturing purposes low-temperature fuel affords no ad- "vantage over that obtainable with ordinary retort or "oven coke." So far as the domestic consumer is concerned, it may be a matter of the right type of fireplace; but there are millions of fireplaces which are not of the right type, and the question from our point of view is, What can the gas industry do for them? That is the problem which several gas-works are engaged upon at the present time. Bare coke yards are better than coke yards filled to overflowing. Even if, at low prices, coke yards are getting rid of their accumulated stocks, that is not the condition which we want permanently to remain. Fair prices for the best quality of coke that science can produce, is a better state.

The increased attention to the science of coke production is one direction in which the old order of apathy is undergoing change to the ultimate advantage of the gas industry. The demands of purchasers are compelling other changes. Tar has now to meet the competition of bitumen. In this relation Dr. Carpenter says: "This has "shown the need of more scientific methods in the prepara- "tion of road tar; and I think in the long-run it will mean "that tar produced in the smaller gas-works will be "handled by those larger undertakings which alone have "the plant and staff necessary for the purpose." This, of course, involves transport costs, whereas the smaller works are situated where tar is required. If improved plants of a relatively inexpensive order are available which will give a proper preparation of tar for road purposes, the matter of meeting local requirement can be solved. But what seems probable is that there will be a gradual disappearance of the smaller works, and a concentration of gas production at the larger and more economically placed ones. If this comes about, then it should have a beneficial effect in bringing along more scientific treatment for all products. The same thing applies to pitch for briquette making. The quality of pitch for this purpose has lately been attacked; and the quality is largely a matter of the carbonization process. With regard to sulphate of ammonia, matters are in better case in respect of neutralization, moisture, and physical condition; and in no respect must there now be inferiority to the synthetic material.

Thus it is seen that developments in other quarters and purchasers' demands have produced or are producing a conversion to those ideals, to those so-called "counsels of perfection," which at one time were scouted; and this conversion is doing its part in adding to the world's economies and efficiencies.

Further Views on the Electricity Scheme.

In the opinion of Dr. Charles Carpenter, a great deal of misapprehension exists regarding the Government electricity scheme. He stated this in his address to the proprietors of the South Metropolitan Gas Company last Wednesday; and it is the easiest thing in the world to agree with him. Misconception on the subject is almost ubiquitous. Where it exists in the least degree is among the technical men of the electricity, gas, and other engineering industries. Otherwise, it is found flourishing in political speeches, in newspapers, and in some places in the public mind—not generally in the last-named quarter, seeing that, were the anticipations of low-priced energy universal, and did the belief exist that the energy to be generated and distributed under the scheme was going to yield all the advantages pictured in imaginative but technically untrained minds, the gas industry would not continue to enjoy, as it is doing, a full-tide application for heating and cooking appliances. Dr. Carpenter indicated that generating costs under the scheme cannot be much affected compared with the working of the best stations to-day, and that the heavier part of supply costs is found in distribution. He detects as an important object of coupling-up the present most efficient stations and others that are to come, and placing an electrical grid over the country, some protection against that besetting trouble of the electricity industry—the ease with which supply can be interrupted, as is illustrated almost week by week by unpleasant happenings. We are not sure that the Government placed any great weight—not so much as they should have done perhaps—upon this consideration. Their most imposing point has been the making of "cheap" electricity available not only in the highways, but in the byways and hedges of our social life and in the sparsely populated areas of the country; and, distribution costs appropriating such a large proportion of the whole, they are just as likely to succeed as a spoilt boy crying for possession of the moon. It may be that success will come in respect of availability; but in electricity supply, as the Government would have it, the greater the availability, the greater the probability that the resistance to cheapness will be of an effective order. If constancy of supply was the primary object, then we think this is rather a matter for the electricity industry itself, and not for the Government. However, Dr. Carpenter has no belief in the scheme resulting in a general cheapening of electricity; but he does believe that the effect upon the industry of the new proposals for a widespread supply of electrical energy has been greatly exaggerated. As to village supply, he has good faith that, in the long-run, greater economy would accrue if outlying villages were encouraged to include a supply of electricity with that of gas, instead of expending money wastefully in running miles of unproductive cables. The combination of gas and electricity is a healthy one; and if gas can be sent into the local holders by a larger gas-works a distance away at a cheaper rate than that for which it can be produced locally, so much the better for the community. The transmission of gas a few miles does not involve so much expense as the transmission of electricity; and there is not the same loss by leakage with a properly laid and jointed high pressure gas-main, or the losses in pressure conversion which exist in connection with electricity. Our conditions are altogether of a superior order for dealing with supply from economically producing works than are those of the electricity industry. Then let us make the best possible use of them.

There is another point which has relation to the Government scheme. What is wanted at the present time is the promotion of those conditions which will assist industry in the most expeditious ways and with maximum effect. It has been acknowledged by the Premier that even if all the anticipations with which the electricity scheme has been cloaked are realized, so far as manufacture is concerned in our large industrial centres no material impression can be made upon existing power costs, which are already low. Our electrical friends admit that, assuming benefit does eventually accrue from the scheme, it will be years before there is realization. Nevertheless, millions are to be spent upon the scheme, without immediate good resulting at a time when such outlay can least be afforded. We see that Lord Bradbury, in an address to the Institute of Chartered Accountants, has deplored the decline there has been in the rate of saving in relation to the national income. A still more serious cause for anxiety which he sees in regard to the future is the enormous growth of borrowing by public authorities; and much of this will not increase the income of the country. He referred to various directions in which money is being spent which will not do anything to affect the income and the profits of industry. Among these expenditures, he mentions the electricity generation and transmission scheme. Lord Bradbury does not like the appearance of things. If, he says, the proportion of loans of this character goes on growing, there appears to be very great danger that the funds available for industry will be insufficient for requirements. There are other passages worth quoting from his address, and outstanding are these: "Among the dan- "gers that stand around the paths of financial and econo- "mic progress, on a capitalistic basis, is the growth of "these semi-social services financed by public authorities. "I do not myself believe that this large expenditure by "the central government and the local authorities on capi- "tal work is consistent with the present capitalistic state "of the organization of society, and either that expendi- "ture will have to be seriously diminished or the principle "will have to be extended, and some attempt at State "regulation of savings and capital will have to be made. "That seems to be the most serious danger." The country cannot afford to overlook the opinions of men of the standing in the financial world of Lord Bradbury. The Government have taken a false step in thinking that greater availability of electrical energy is the foremost

need of the industry of the country. They should look in other directions.

Another point is as to the probable effect of the electricity scheme upon the interests of the gas industry. If the scheme has not the inherent power to produce the benefits predicted by its authors, the trend of things will be much the same as before. The reduction of cost of electrical energy through the scheme is one of its most unlikely issues. But though conditions be never so favourable, no legislation can compel the public to patronize. The electrical circumstances on the North-East Coast are often quoted as affording an example of what should in electricity supply be found elsewhere in the country. But withal in that area, the gas business continues to expand; and in a most gratifying fashion, which shows that the availability of cheap electricity—that is cheap as electricity goes—does not turn public preference from an agent which they know from experience is more economical, efficient, and reliable. As Mr. John E. Cowen stated at the annual meeting of the Newcastle and Gateshead Gas Company, they have been competing with super-power stations for a good many years. Notwithstanding, last year the Company had an increase in the sale of gas of 5½ p.ct. on top of a 4¾ p.ct. advance the previous year. On Dec. 31 last, there were 18,000 more gas-consuming appliances in the district than at the end of 1924. In addition, about 16,000 lighting fittings, exclusive of burners, were supplied by the Company. In the area, there are about 100,000 gas-cookers and approximately 50,000 gas-fires installed; and some 97 p.ct. of the medical men use gas-fires. This is invaluable experience in these times; but it must not be overlooked that the results are not the product of inactivity. The Company have a highly organized public service system; their propaganda is of an ideal order; and they operate with the keenness which a spirited rivalry demands. The main point is what they are able to do in effecting progress with gas in the model electricity supply area of the country.

Coke Research.

There is no knowledge on our part as to what will be the composition of the technical programme for the next meeting of the Institution of Gas Engineers; but in view of the Coke Competition and the large amount of interest that last year was aroused in the question of more scientific methods being applied to the production of coke, we are sure the good work would be advanced by the Council of the Institution arranging for a full debate on the subject in June. The chemical engineers have done excellent work in organizing discussion on the matter; the coking industry is far in advance of the gas industry in the utilization of scientific methods for coke production, and the characteristics of their product can be varied as the markets for metallurgical, industrial, or domestic coke invite; and now a Committee have been formed to organize research on blast-furnace coke. The first purpose of this research is to identify and specify the characteristics of cokes which render them of greater or less value as blast-furnace fuels; then the co-operation of the coke producers will be required to investigate the means whereby cokes of the required specifications can be most readily and most economically made. This work is being carried out under the direction of Profs. C. H. Desch and R. V. Wheeler, in the Metallurgical and Fuel Laboratories of the Sheffield University, where special apparatus is being installed for the purpose. It will be regrettable if the gas industry does not, being such a large producer of coke, keep itself well in front in the scientific work connected with coke manufacture. There is plenty of room for the improvement of gas coke; and the ways and practicable means of producing improvement should be thoroughly explored—particularly from the point of view of whether, in order to maintain better demand and prices, the cost of bringing about change in our retort charges, and thus in the characteristics of coke, would not be an economic advantage. Coke should, if possible, be made a real rival of coal for domestic purposes, having in view those 36 to 38 million tons of raw air-polluting coal used annually in the households of the country. In the paper which Mr. F. H. Arms—the winner of the highest award in Section III. of the Coke Competition—recently read before the Midlands Gas Salesmen's Circle (see "Gas Salesman" for Feb. 24), he indicated his view that the gas industry as a whole should turn its attention to the possibilities of the development of the domestic coke trade, seeing that the industrial market for coke is now fairly well covered, and the domestic market would not be subject to the same fluctuations as the industrial one. This is recognized; and the opportunities that are open in this direction have awakened in many gas undertakings a new interest in their chief secondary product, and a desire to determine what can be done to obviate slumps in coke revenue, and the considerable disturbance of the balance of accounts, which have been experienced lately. They are old, but we hope remediable, troubles in the industry. If they can be averted, the better it will be for our general welfare. We hope the Council of the Institution will realize the opportunity they have for producing a development of interest, as well as the responsibility which rests upon the Institution as the chief technical organization of the industry.

Lowest Priced Gas in London.

We admire the little Hornsey Gas Company—little among neighbours of immense business girth. Notwithstanding the size of the undertaking, it carries its banner proudly, for practically continuously for some years now it has been able to inscribe on it, "The lowest priced gas in London." It has not the advantage of waterside premises and the other benefits claimed for large concentrated production; yet, with an output of 760 million c.ft. a year, it is in these times able to sell gas at 8½d. per therm. The nearest charge to this to-day in the London area is the 8¾d. per therm of the South Metropolitan Gas Company. The Hornsey Company have a modest capital account, which is not the only thing that counts. The Chairman of the Company (Mr. A. M. Paddon), at the recent meeting of the proprietors, acknowledged the high state of efficiency to which the works have been raised under the able management of Mr. J. W. Buckley, M.Inst.C.E. It is clear that there is a strong determination on the part of all concerned in the operations of the Company to maintain that high standard, and the position in regard to cheap gas.

The Coal Subsidy.

A statement issued by the Mines Department shows that the cost of the coal subsidy in January was £2,938,300; making the amount of the payments for a period of six months £15,144,122. Inasmuch as the estimate of expenditure for January was £2,600,000, the excess call for that month was £338,300. It will be remembered that Parliament has voted £19,000,000 to make provision for the subvention to the end of this month. It is believed that the cost for February and March will be on a lower scale than for the preceding months; but despite this there is little doubt that the £19,000,000 will prove insufficient.

Condensation.

Published in other columns of this issue of the "Journal" is an abstract of a thesis on coal gas condensation which gained for its author, Mr. T. H. Prater, of Tottenham, the Diploma of the Institution of Gas Engineers. The thesis, which is of a high standard, is decidedly original. Mr. Prater observes that at present it is desirable that the gas should carry as much hydrocarbon vapour as possible, not only because the vapour is more remunerative than the liquid, but also because its presence in the gas tends to a reduction in naphthalene and meter troubles; and he goes on to ask if there is any reason why the greater portion of the benzole in the tar should not be vaporized into the gas. This, he says, could be easily done, for the gas is by no means saturated with benzole vapour, even with the most careful condensing. Briefly the proposals are as follows: The gas is first subjected to shock cooling—the bad effect of this, it is stated, has been greatly exaggerated—and is then re-heated, and passed through a hot tar washer. Subsequently it is re-cooled in water-cooled vertical tube condensers fitted with scrapers. Mr. Prater makes it plain that it is possible to dehydrate the tar almost completely by the treatment he outlines, at the same time increasing the yield of ammonia per ton recovered as liquor, and also the quantity

of C_nH_m in the gas. If the latter is subsequently washed for naphthalene with a benzolized wash-oil, an increase in the saleable salt would result from the adoption of hot tar washing. In the course of a discussion which followed the reading of this abstract at a meeting of the London and Southern District Junior Gas Association last Friday, Mr. W. Newton Booth suggested that the same end could be achieved by employing ordinary methods of condensation, and treating the tar in a separate plant. The hydrocarbon vapours from the tar could then be added to the gas as desired. There can be no doubt that Mr. Prater's contribution to the subject of coal gas condensation will be read with great interest.

Coal Commission Report.

It is anticipated that the report of the Coal Commissioners will be ready for issue early next week. It is stated that the document is a voluminous one.

The Electricity Bill.

The examination of the Government Electricity Bill by the Home Affairs Committee of the Cabinet was completed on Monday last week, and the measure was then available for the approval of the Cabinet. In Ministerial circles, it is hoped to obtain second reading before Easter. The Minister of Transport (Lt.-Col. Wilfrid Ashley) will have charge of the measure in the House of Commons; and in Standing Committee Sir Douglas Hogg will be responsible.

Fuel Control in Italy.

Proposals are taking shape in Italy which have in view to ensure that fuel is used efficiently and economically. It appears that the Italian Cabinet have approved of two Bills which are expected to be of great importance to the country. One of them provides for the control of fuel; and the present associations of users of steam boilers are amalgamated into a single body—the National Association for Fuel Control. By this organization control will be exercised over all fuel-using apparatus and engines, in order to enforce regulations suggested by the latest developments of technical science, so that the utilization of fuel may be attended by as little waste as possible. All old apparatus and engines possessing a low degree of efficiency are to be replaced within a reasonable time by plant working to modern standards of efficiency. Measures for the better utilization of home-produced fuel are contained in the second Bill. We wonder how British manufacturers with uneconomical plant would regard this interference. At the same time, plant economy and efficiency in our industries is a matter of national importance.

Electricity and Gas as Fire Raisers.

It is interesting to note that the report of the Superintendent of the Manchester Fire Brigade for the year ended December last shows that the number of fires due to electricity was 46, while the number occasioned by defective gas fittings and gas jets left burning was 24. Electrical contemporaries and Electrical Development Association, please copy.

Petrol and Benzole Prices.

It was announced last Friday that the prices of motor fuel and lamp oil were to be increased by 1d. per gallon, owing to the cost of crude oil in the U.S.A. It is stated that this year the supplies of oil are on the short side; and this accounts for the rise in the price of crude oil. In 1925, the importation of petrol was 404,874,801 gallons, and of crude oil 561,621,482 gallons. The benzole produced in England amounted to 22,000,000 gallons. Nevertheless, the demand for motor spirit still increases with the more general use of motor vehicles. The prices of National Benzole and National Benzole Mixture have also been increased by 1d. per gallon.

The Absolute Commissioners.

Through a remark made by the Minister of Transport in the House the other night, the question has again been raised (as it was in the Lords recently) as to whether the Electricity Commissioners are to be invested with the power to override the decisions of Parliament. The point arose on the occasion of the rejection of the London Power Company's Bill, which is a measure that proposed to confer authority to erect a large power station for the West-End Companies. The rejection was brought about by a Socialist motion, and was carried by 137 votes to 110. But the interesting point is that the Minister of Transport (Lt.-Col. W. Ashley) mentioned that he was inclined to regret that the Bill had not been delayed until the electricity proposals of the Government had been brought forward. Although he described his attitude as purely impartial and non-committal, he advised that, before the Bill left the House, section 11 of the Electricity Act of 1919 should be inserted. By this the Electricity Commissioners would have to decide whether the station should be built by the London Power Company or by the Joint Electricity Authority. Furthermore, he suggested that the House should see that a clause was also incorporated giving the Joint Electricity Authority permission to purchase the site, if the Commissioners decided that the station should not be built by the Power Company. As is well known, Mr. G. Balfour (Hampstead) is largely interested in electricity supplies; and he expressed surprise that the Minister of Transport should suggest that provision should be made for leaving the Power Company dependent on the will of a Department, who would also decide whether or not decrees of the House were to be put into effect. In Mr. Balfour's opinion, this is a very dangerous policy. Electricity had a bad time in the House last week. Against the view of the Minister of Transport, the Metropolitan Electric Supply Company's Bill was also rejected.

Coal Exports.

In view of the improved activity which has been reported in the coal export trade, it will come as a little surprise to find that the shipments in January were somewhat lower than those for the preceding month; the fall being about 484,000 tons. The actual quantity of coal of all sorts shipped in January was 4,148,042 tons, as compared with 4,366,051 tons in January, 1925, and 5,440,637 tons in January, 1924. The values of these quantities were: January, 1926, £3,821,336; 1925, £4,708,978; 1924, £6,678,877. Of these quantities and values, gas coal was represented by the following returns: January, 1926, 562,516 tons, of a value of £459,835, which averages a shade over 16s. 4d. per ton—to find the equal of which price for lowness one has to go back many long years. The gas coal export business in January, 1925, amounted to 551,776 tons, of a value of £572,718. The quantity of gas coal sold abroad in January, 1924, was 625,067 tons, of a value of £755,467.

Gas Coke Shipments.

The quantity of gas coke shipped in the first month of the year was 137,751 tons, the value returned for which is £139,832, which averages £1 0s. 3·6d. per ton. In the first month of 1925, only 63,806 tons were shipped; but in January, 1924, 144,402 tons were sold abroad. The value in January, 1925, was £99,878; in January, 1924, £249,330. The figures show what a considerable decline there has been in the value of gas coke sold to foreign customers.

Exports of Tar Products.

There was quite a burst of business in benzole and toluole during January; the quantity exported being 357,527 gallons, as compared with 60,228 gallons in January, 1925. The value of last month's exports in this line was £30,712, as compared with £5925 in January, 1925. In regard to naphtha, 18,363 gallons were sent abroad last month, as against 2413 gallons in January, 1925; the values respectively being £1658 and £273. Regarding tar oil, creosote, &c., the shipments last month were 4,648,484 gallons, of a value of £141,388. In January, 1925, the amount exported was 3,668,407 gallons, of a value of £99,785.

Sulphate of Ammonia Shipments.

January this year was not so good as the same month of 1925 for overseas business in sulphate of ammonia. The amount sent abroad was 22,786 tons, as compared with 32,434 tons in January, 1925. The value of last month's exports was £290,375 as compared with £427,141 in January, 1925. The falling-off was spread over all the countries which are our principal buyers.

PERSONAL.

Mr. L. H. Thomas, of Birmingham, has been appointed Works Superintendent at the Smethwick Corporation Gas-Works.

Mr. F. G. Cockey, Wh.Sc., who was for many years Manager of the Gas Meter Company, Ltd., has now severed his connection with that Company, and has become a Director of Smith Meters, Ltd.

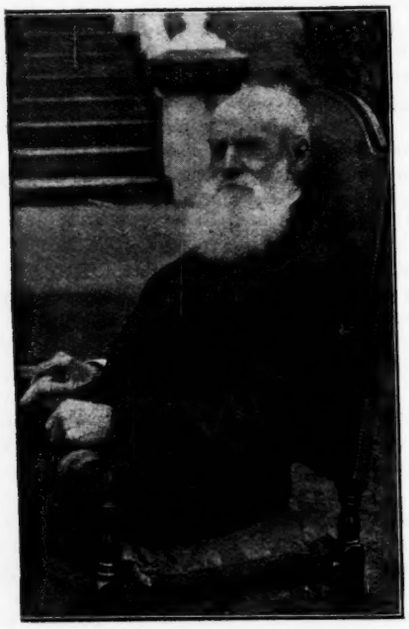
Alderman J. H. Lloyd (the Chairman of the Birmingham Gas Committee) is on his way to South Africa. The voyage is being made in order that he may attend the wedding of his son, though considerations of health have also been an influencing factor. The Alderman is one of the three oldest members of the Birmingham City Council, having been first elected in November, 1891.

Many members, past and present, of the Midland Junior Gas Association will remember the time, now long behind us, when Mr. Harold E. Temple, F.C.S., was Honorary Secretary; and they, with his other friends in the industry, will join with us in wishing him abundant success in his new venture. Mr. Temple, who is in practice as a consulting chemical engineer, has been appointed Associate Editor and General European Correspondent of a new American technical publication entitled "Coal," the first issue of which has quite lately made its appearance. It is a paper which will devote itself to the interests of the coal industry, those who serve it, and those whom it serves. Those who control "Coal" believe that better functioning of the industry is needed, elimination of waste, unification and co-ordination, more economic and technical research, and greater efficiency and vision; and all these requirements it will be their aim to assist in filling.

OBITUARY.

LAWRENCE CLAYTON.

A venerable Leeds citizen, and prominent constructional gas engineer, died in his 84th year on Friday last, at his residence, Oakhill, Moortown—Mr. Lawrence Clayton, of Messrs. Clayton, Son, & Co., Ltd.



The late Mr. Lawrence Clayton.

A Lancashire man, born at Nelson in 1842, he was apprenticed as a smith and boilermaker in that town. He obtained his first experience in gasholder making and building at the works of Messrs. Mabon, at Gorton, Manchester. In early life he thought of going to Australia to start business there, and went so far as to pack up the necessary tools, but then changed his mind, and arranged to settle down in Hunslet, where he commenced business at the age of 22, along with his father, Mr. Leonard Clayton.

The first order obtained by the young firm for a gasholder was from Spilsby, Lincs. The holder is still working, and the written order for same is displayed, framed, in the works' office at Moor End. Since that time the name of Clayton has been associated with some of the largest contracts for gasholders, tanks, and structural work that have been carried out in Great Britain and other parts of the world—notably the 12,000,000 c.ft. gasholder at East Greenwich and the 9,000,000 gallon overhead tank at Calcutta.

In 1906 Mr. Clayton turned his attention to the making of welded steel water mains, and fitted up a special works for this purpose at Pepper Road, Hunslet, where important contracts for Leeds, Manchester, Aberdeen, and other centres have been carried out.

Mr. Clayton's business called him away from home so much that he was precluded from taking any part in public affairs, beyond occasionally sitting on the Bench as a City Magistrate. Up to the autumn of last year he was wonderfully alert in every way, and was actively engaged in the affairs of his various Companies. Mr. and Mrs. Clayton celebrated their Diamond Wedding in June, 1923; and to mark the event their children endowed two cots in their name at the Leeds General Infirmary. Mrs. Clayton, who is 90 years of age, survives her husband, with one son, Mr. Joseph Clayton—who is the Managing-Director of Messrs. Clayton, Son, & Co.—and five daughters.

Mr. Clayton was held in the highest esteem by all who knew him, not only for his engineering knowledge and skill, but also for his attractive personality. It was most interesting to hear him give the experiences of his early struggles; and being in harness, as he was, up to nearly 84 years of age, he was in touch with engineering practice both of the past and the present.

Mr. P. E. Neighbour, Chairman and Managing-Director of the Henley-on-Thames Gas Company, died at his residence, 71, Belle Street, Henley-on-Thames, on Monday, Feb. 22. He had served on the Board of Directors 29 years (8 years as a Director, 16 years as Chairman, and 5 years as Chairman and Managing-Director of the Company).

The death of Dr. George Booth has removed one of Chesterfield's best-known public men, and one who had taken a prominent part in the town's affairs for over half-a-century. He was a member of the Chesterfield Town Council from 1882 until 1920, when he retired as an Alderman; and he was a member of the Chesterfield Gas and Water Board during the period of its existence.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

March 5.—Manchester District Institution of Gas Engineers.—General meeting at the Midland Hotel, Manchester, at 2.30.

March 6.—Manchester and District Junior Gas Association.—Visit to the Crewe Gas-Works and Locomotive Works.

March 9.—National Gas Council.—Meeting.

March 9.—Federation of Gas Employers.—Meeting.

March 11.—Midland Association of Gas Engineers and Managers.—Annual general meeting at the Imperial Hotel, Temple Street, Birmingham, at 2.30.

March 18.—Murdoch Lodge No. 3480.—Installation meeting.

March 23.—Southern Association of Gas Engineers and Managers.—Annual general meeting at the Hotel Cecil.

March 24.—Evening Star Lodge No. 1719.—Installation meeting.

May 5.—Society of British Gas Industries.—Annual general meeting at the Hotel Cecil, under the presidency of the Rt. Hon. Sir Alfred Mond, Bart., M.P.

May 6.—Eastern Counties Gas Managers' Association.—Spring meeting at Ipswich.

May 13.—Midland Association of Gas Engineers and Managers.—Spring general meeting at Dudley.

Institution of Gas Engineers.

March 9.—Education Advisory Committee.

March 10.—Emergency Committee, Finance Committee, and Benevolent Fund Committee.

Southern Association of Gas Engineers and Managers.—The annual general meeting of the Association will take place on Tuesday, March 23, at the Hotel Cecil, Strand, W.C., at 2.15, and will be preceded by a luncheon at 12.30. In addition to formal business, the President (Mr. R. Robertson) will deliver his address; and Mr. P. G. G. Moon will be presented with a memento of his year of office.

Institution of Public Lighting Engineers.—In connection with the annual meeting and conference at Newcastle-upon-Tyne, we are informed by Mr. W. J. Liberty (the Hon. Secretary) that it is proposed to hold an exhibition of up-to-date lighting appliances, both gas and electric. The exhibition will be opened by the Lord Mayor of Newcastle, and will remain open during the three days of the conference—Sept. 14, 15, and 16. Firms desirous of exhibiting should apply at once to Mr. R. Davison (President-Elect), Public Lighting Superintendent, Corporation Lighting Department, Blagdon Street, Newcastle-upon-Tyne, stating the amount of space required, and whether electric current or gas will be needed for the exhibit.

ELECTRICITY SUPPLY MEMORANDA.

AMONG the guests at the annual dinner of the Institution of Electrical Engineers was the Minister of Health, the Rt. Hon. Neville Chamberlain. The speech which he made on the occasion showed a profound belief in the benefits with which hypothesis alone has credited the Government Electricity Scheme. Upon his statements comment was made in the editorial columns of the "JOURNAL" for Feb. 17. We were not present at the function; and there has been a little wonder on our part as to how the electrical engineers who were present received the optimistic views of Mr. Chamberlain. Criticism of the scheme by electrical engineers has been of a fairly intense order; their opinions having a strong leaning towards the scheme being an adversity instead of a potential advantage to the electricity industry. The "Electrical Review" has made no secret of the manner in which the speech of the Minister of Health was received. It states that Mr. Chamberlain doubtless anticipated that his remarks would arouse the enthusiasm of a meeting of 500 electrical engineers. If he did, he was disappointed; for (quoting our contemporary) "his reference to the benefits to be conferred upon the industry and the nation by the provisions of the scheme were received with frigid silence, the only attempts to applause being accorded to the assurance that no subsidy, no nationalization, and no more State interference than was unavoidable were contemplated." The "Review" also says that, in the presence of his ministerial guests, the President of the Institution refrained from criticism, and not a discordant note marred the proceedings. "But the silence was eloquent."

Left Cold.

Mansion Fires and Insurance.

The public are getting just as accustomed to electrical denials of allegations that the destruction of premises is caused by fires electrically generated as they are to the allegations themselves. The persistence of the denials has really hardened people's belief that there must be something in the indictment. Moreover, so many people have had incipient trouble through electrical fusings that they now know from personal experience that it is a potent source of danger. Public opinion and insurance experts are perturbed over the large amount of destruction there has been in recent times of old historic mansions, many of them containing treasures of great worth and irreplaceable. An insurance correspondent of "The Times" has published a list of nineteen fires which have occurred in palatial dwellings since the beginning of last year, the total loss involved being estimated at £569,000. In only four cases is the cause given; in the others the causes are unknown. The most disastrous destruction, both in life and property, was at Oulton Hall, when damage was done computed at £200,000. Many of these old houses have stood for ages without anything happening to them. Why then the frequent conflagrations in these times? They must be due to something which has had relatively modern introduction. It may not always be electricity; but electricity is not the sweet, well-behaved thing that the electrical people pretend it is—which pretence the public have begun to assess in their own way. But there is little doubt—the circumstances point to it—that some of the fires have been originated by electricity. Some of these old places have been wired for perhaps twenty and more years; and no doubt much of the insulation has perished. The wiring, in short, ought long since to have been renewed. That it has not been is simply "asking for trouble." And trouble arises in an insidious way with electricity. It goes to work in a silent manner, gives no indication that it has commenced, and in these old rambling houses a fire may be started and get good hold in a room or position which is rarely visited. The "Insurance Correspondent" of "The Times" mentions a number of likely causes of fire in these mansions. He remarks: "Electric light has frequently been fitted; and the fact that some of the outbreaks have originated in the roof suggests that either the electrical equipment or the flues may have been at fault." He urges that electric lighting installations should be examined periodically. It is also stated that there is now a strong feeling in insurance circles that the different descriptions of risks should be rated according to their merits. "The present practice of treating all kinds of private houses on much the same basis can be criticized as being unscientific; and it will not be surprising if in future this system is changed." We know that recently the Fire Offices approved of the Institution of Electrical Engineers' regulations for electrical equipment, and adopted them as standard practice. It is clear the Fire Offices are not now so convinced of the innocence of electricity.

Old Equipment.

There has been correspondence in the Press on the subject, which again will not please our electrical friends, who will say: "Why all this talk when it is not proved that the fires are due to electricity?" If it is not proved, there are indications that electricity is strongly suspect. Take a letter in "The Times" by Mr. S. G. Castle Russell. He draws attention to a danger which is not fully appreciated—that is, defective electric light installations made twenty-five to thirty years ago which have never been renewed. He refers particularly to wood-encased wiring, which is a ready means of conveying fire if there is an escape of electricity. When the wiring becomes faulty, an outbreak of fire, he says, is almost inevitable. It should be renewed; but in many instances owners are not now in the position to incur the heavy expense of re-wiring, and so the risk is allowed to run on. We admit the heavy expense of wiring; but the expense and inconvenience of being deprived of one's home is immeasurably worse. Mr. Castle Russell favours a screwed and earthed system of tubing. But he submits to our morning contemporary that it will be doing a public service by drawing the attention of house owners and tenants to the necessity of satisfying themselves that the electric lighting installation is not a potential danger. In the "Manchester Guardian," "J. J. R." also advocates metal conduit in place of wooden casing. We have a few more records of fires "believed" to have been caused by electrical fusings; but they need not be utilized on this occasion. There is no question the public are "getting the wind up" over electrically generated fires; and they are not disposed to place reliance in electrical denials. They come from those who are interested in denying, though knowing full well that electricity is a bad mischief maker, and an expensive one.

Foolish Comparisons.

We have often commented on the futility of making cost comparisons between the various agents for domestic heating without giving an account of the work actually performed, so that the value of the figures advanced can be tested. The "Electrical Review" for Feb. 19 quotes some costs in a paragraph headed "An All-Electric Comparison." It is stated that the figures are interesting because they show the expenditure for twelve months in two houses—one using electricity only, and the other electricity, gas, and coal, for all domestic services. These houses are in the Sheffield electricity supply area. The figures are as follows:

> "*All-electric*" *house:* Fixed charge, 10 p.ct. of rateable value, £3; energy consumed, 7647 KW.-H. at 0·5d. per KW.-H. £15 18s. 8d.; *plus* 20 p.ct., £3 15s. 9d.—total cost £22 14s. 5d., averaging 0·7d. per KW.-H. *Electric, gas, and coal house:* Electricity for lighting, 223 KW.-H. at 4d. per KW.-H, *plus* 10 p.ct. and meter-rent, £4 11s. 4d.; gas for cooking, 18,700 c.ft., £2 18s. 6d.; coal for heating, cooking, and hot water (10 tons 2 cwt.), £20 8s. 5d.—total cost £27 18s. 3d. The figures for the all-electric house, the rateable value of which was £30, represent the costs for the twelve months ending June, 1925, and the electricity, gas, and coal figures for the other house (rateable value £24) are the costs for the equal period ending December, 1924.

If we assume that the electricity used for lighting in the second case—viz., 223 KW.-H.—would apply to the all-electric house, we find that in this there were used for other purposes (heating, cooking, and hot water supply) 7424 units, which are equivalent to 25,330,688 B.Th.U. In the second case, it is noticed that only 18,700 c.ft. of gas were consumed for cooking, while the coal burned for heating, cooking, and hot water amounted to 10 tons 2 cwt. Assuming that the gas has a calorific value of 500 B.Th.U. per c.ft., the 18,700 c.ft. would be equivalent to 9,350,000 B.Th.U. The 10 tons 2 cwt. of coal, allowing a calorific value of 28,000,000 B.Th.U. per ton, would have a total calorific value of 282,800,000 B.Th.U. Adding to this the 9,350,000 B.Th.U. of gas used, we get a total of 292,150,000 B.Th.U., which according to the "Electrical Review's" comparison is only capable of doing the same work as 25,330,688 B.Th.U. supplied by electrical means! We ask the "Review" whether the comparison it puts forward as an "interesting" one is also a fair one, and can it possibly be justified on fundamental data? Let us assume that the gas for cooking is used (taking hotplate and oven together) at an average efficiency of 50 p.ct. That would mean 4,675,000 B.Th.U. Let us also assume that the 10 tons 2 cwt. of coal is used at only 20 p.ct. efficiency, which would mean 56,560,000 B.Th.U.—together 61,235,000 B.Th.U. Again we ask the "Electrical Review" (which knows very well that for cooking electrically and for water heating, there is a waste of heat energy by electrical appliances), whether the 25,330,688 B.Th.U. can do the work of the 61,235,000 B.Th.U., which represent the result of calculating on the efficiencies given for gas and coal. Comparisons of the nature quoted from our contemporary are foolish in the extreme; and we are surprised to find such statements presented in any technical paper without supplying the basic data necessary to attest the genuineess of their value.

Assisted Wiring Terms and Progress.

The policy of assisted wiring and hire purchase is being extensively developed in the electricity industry, as this appears to be the only way in which the undertakings can hope to obtain a new class of consumer for lighting purposes. The initial cost of installation is found to be an obstacle to an extension of demand; hence the putting into operation of these methods. It will be interesting to readers of the "Memoranda" to give a few examples of the terms which have been adopted by various authorities. In the case of Hampstead, the charge for rent and repayment under the scheme introduced by the Borough Council Electricity De-

partment is 2d. per unit over and above the flat rate at present in force—*i.e.*, 4d. *plus* 2d. In this case there is to be a minimum consumption. Installations of four to eight points must consume 20 units per quarter, or be charged for them; and installations of nine to twelve points, 30 units, *plus* in all cases 1s. per quarter meter-rent. It is estimated that the installation will be fully paid for, including maintenance and interest, in ten years. The information is given that during eighteen months 1080 applications have been received and accepted, and the capital expenditure (taken from net revenue account) has been £7903. Chester has adopted a scheme for wiring on the hire-purchase system. In this instance no more than eight points are provided at a cost not exceeding £10. Payment is made by prepayment meter at the rate of 2d. extra per unit, with an additional ¼d. per unit as meter-rent. Each 175 units is reckoned as £1 towards the cost of installation. Alternatively, the consumer can meet his liability by monthly or quarterly payments at a rate to be calculated by the Electrical Engineer. The installation is maintained free of cost until it is paid for. At Ipswich, a rental wiring system was adopted some time ago; and under it 1200 installations have been made. The rentals up to March 31 last amounted to £11,500, while the expenditure, including repairs, interest, and repayment of loans, and the necessary writing-down of capital on installations, amounts to £11,800. These installations refer to lighting only, and apply chiefly to the smaller houses in which only a few lights are required. The Chief Engineer and Manager of the Electricity Department (Mr. A. S. Black) states: "We do not think the effect upon our load factor is worth considering." In working out the rental, 1 p.ct. of the cost of the installation is allowed to cover maintenance and inspection. The point as to the load factor being relatively small is also made by Mr. R. V. Macrory, the City Electrical Engineer of Londonderry. In his case he has 878 houses connected; and the total demand is only equal to about 65 KW. Here shilling slot-meters are installed; and ½d. per unit is added to the ordinary rate per unit, and for wiring 1½d. per unit, until at the meter reading date the consumption amounts to not less than: Eight-light installation, 2000 units; six-light installation, 1500 units; four-light installation, 1000 units. After these consumptions, the price is reduced to ½d. per unit above the ordinary rate to cover the cost of meter-rent. The installation then becomes the property of the householder. In the case of Walthamstow, the Electricity Department provide and maintain the essential wiring and accessories on a rental basis, calculated at 4s. per quarter for each £10 expended; the hirer purchasing and maintaining such fittings, shades, and lamps as may be required to complete the installation. In this case another scheme has been introduced under which radiators and other domestic apparatus, costing £1 10s. and upwards, can be hired at a rental of 15 p.ct. per annum of the value, inclusive of maintenance. The Horsham District Council have adopted a scheme under which the terms of rental are: Four-point installation, 12s. per annum, 3s. per quarter; five-point installation, 15s. per annum, 3s. 9d. per quarter; six-point installation, 18s. per annum, 4s. 6d. per quarter; seven-point installation, 21s. per annum, 5s. 3d. per quarter; eight-point installation, 24s. per annum, 6s. per quarter; nine-point installation, 27s. per annum, 6s. 9d. per quarter. The Burnley Corporation have a deferred payment system in which a four-room dwelling is provided with wiring at £12, of which 36s. is an immediate deposit; the balance being paid at 12s. 9d. per quarter. At Annfield Plain a system has been introduced under which a charge of 7d. per unit is made, *plus* 3d. for meter and installation hire. Sixpenny slot meters are used, which are calibrated for 10d. per unit. Heckmondwike and Tynemouth are among other places which have recently adopted an assisted wiring system. In the case of South Shields, the last report states that, under the scheme there, 10,600 applications have been made, and 5050 consumers connected. Many undertakings have also introduced a hire-purchase system in respect of heating and cooking apparatus.

THE "ELECTROLUX" REFRIGERATOR.

A Continuous Action Apparatus which can be Operated by Gas.

There is perhaps little need at the present day to enumerate the many uses of a refrigerator in the home, and in innumerable other situations; but it is to be feared that the importance of these uses from a health point of view is not yet realized so generally as it should be; though education on the subject is proceeding apace. After a lengthy inquiry by a Committee, the Ministry of Health have now issued regulations which, at the end of a given time, entirely prohibit the use of the most widely known preservatives, and permit only under rigid conditions the use of two others in a short list of specified articles; and this Committee, in making their report, emphasized the value of refrigeration as a substitute for chemicals. Facilities for refrigeration in bulk are, of course, provided in many of the big freight steamers, and there are warehouses, &c., specially equipped with cold storage in numerous large towns. The provision for subsequent stages is less adequate, and as far as the consumer's home is concerned is exceedingly small. With a keener appreciation of the real facts relating to food preservation, there will be a vastly increased demand for domestic refrigerators; and an invention of two young Swedish engineers—Messrs. B. de Platen and C. Munters—has enabled Electrolux, Ltd., of 153-155, Regent Street, London, W., to place upon the market an apparatus which would seem to fill every requirement for such use, as well as being applicable to other situations.

The "Electrolux" refrigerator is on the ammonia evaporation principle; and it is claimed for it that it is the only known contrivance which will continuously produce cold without the use of any mechanical moving parts. The apparatus consists of three cylindrical iron vessels connected by iron pipes, charged with a certain quantity of distilled water, ammonia, and an inert gas such as hydrogen; the whole system of pipes and cylinders being welded together, and thus hermetically sealed, so that escape of the liquid or gaseous contents is impossible. Means are provided for applying heat—and this heat may be supplied by gas, equally as well as by any other method, the consumption of gas being almost negligible—to one of the cylinders; and a small quantity of water is allowed to flow over one of the other cylinders, and also round one of the connecting pipes. Cold is continuously produced in the third cylinder so long as the supply of heat and water is maintained. The apparatus is, in fact, of the utmost simplicity. The liquids and gases with which it is charged are used over and over again, and will last for many years.

In all continuously operating refrigerating apparatus it is essential that there shall be a relatively high pressure in one part of the apparatus and a relatively low pressure in the other part, and that some refrigerating medium shall circulate from the high-pressure side to the low-pressure, from which it must be returned to the high-pressure side; and a reducing valve and some mechanical form of power have hitherto been customary. In the case of the "Electrolux," however, the inventors have overcome all difficulty in the circulation of the refrigerant due to difference of pressure, by introducing (say) hydrogen into the low-pressure part of the apparatus, so that the total pressure there is the same as in the high-pressure part. They have, indeed, made use of a well-known property of gases, defined by Dalton's Law, according to which, if there is a mixture of gases in any vessel, the total pressure will be the sum of the pressures which would be exerted if each of the gases occupied the same vessel alone. Thus there is still a high-pressure and low-pressure side of the apparatus so far as the refrigerant is concerned; but the introduction of the additional inert gas makes the total pressure on the low-pressure side equal to the high-pressure side—or, in other words, the actual pressure is practically uniform in all parts of the apparatus. The consequence of this is that all difficulties of circulation are at once removed; circulation being set-up by the application of heat to one part of the apparatus, just as in a hot water circulating system, without the use of any moving parts of any description.

The principle upon which the invention is based is complex; but it was elucidated at a demonstration last week by Dr. H. S. Hele-Shaw, who said that the first vessel, under which the supply of heat is placed, is called the generator; the next, round which the cooling water circulates, is the absorber; while refrigeration is produced in the third vessel, termed the evaporator. Applying Dalton's Law, already referred to, if a sufficient quantity of hydrogen is put into the vessel to give a pressure of 150 lbs. per sq.in., and sufficient ammonia to give a pressure of 30 lbs., the two together will furnish a working pressure of 180 lbs. in the whole system. Now while the hydrogen under such a pressure and under ordinary temperature will always remain in a gaseous form, the ammonia under a total pressure of 180 lbs. per sq.in. can be made, by the cooling system, to pass into the liquid form. When it finds itself in the evaporator, which is placed inside the refrigerating chamber, it can draw sufficient heat from that chamber—and, of course, from the articles placed there—to pass into the liquid form at the expense of the heat of those articles, thereby producing refrigeration. The hydrogen and ammonia gas, being heavier than the hydrogen alone, pass to the bottom of the evaporator; and the hydrogen, being lighter, rises again by a circular route to the top of the vessel, while the ammonia gas, under the cooling effect of a stream of water, becomes absorbed, and passes round into the generator, at the bottom of which is placed the necessary source of heat to cause circulation.

Once started, the process will be automatically and continuously maintained without requiring any attention whatever.

CO-PARTNERSHIP.

[Paper by Dr. Charles Carpenter, C.B.E., at the Birmingham University, Feb. 1.]

The problems associated with the relations of Capital and Labour have occupied a prominent place in the minds of economists and industrialists for the greater part of two centuries. The discovery in the middle of the eighteenth century of the commercial possibilities of steam as motive power completely altered the aspect of industry in this country; and out of what is known as the "Industrial Revolution" emerged our modern capitalist system. Indeed, I suppose it would not be too much to say that, even before that time, industrial unrest was not unknown. It was, however, about 1750, when machine power began to take the place of hand power in many industrial processes, that the pursuits of the people underwent a radical change. Before that time, the workers could very roughly be divided into two classes—craftsmen and labourers. In the old craftsman, Capital and Labour were united in the same individual; and the various Trade Guilds, with their apprenticeship regulations, effectively maintained the quality of, and the pride he had in, his work. The labourers, however, had not long been emancipated from a status of mere serfdom.

Soon after the introduction of machinery, an exodus began from the country to the new cities; and the family trades, as exemplified in the old-type craftsman, gradually disappeared. In a similar manner, the small farmers and labourers were eliminated by the new developments in farming which took place about the same time. Large factories and workshops employing hundreds of "hands" appeared, and were controlled by perhaps one man, who came to be known as a capitalist. Thus the old social habits and personal relationships of the workers underwent a radical change; and it is not surprising to find that a great many abuses grew up in the fierce and eager contest for wealth under the new system. Long hours, low wages, bad working and social conditions led to the passing of several Acts designed to ameliorate the lot of the workers. Trade unions began to be established, and gained in power, until in 1871 they were legalized. The Trades Disputes Act of 1906, by which acts done by the unions in furtherance of a trades dispute are not unlawful, indicates the extent to which organized labour has progressed.

With the advent of joint-stock companies in 1844, what was left of the personal association and intercourse of the workers began to be lost in what has been called "the soullessness of joint-stock companies." Organized labour began to be opposed to organized capital; and at the present time there exist huge employers' organizations, and equally influential employees' organizations, divided, as it were, into two hostile camps on the main question as to an equitable division of the product of their joint efforts.

I have given this extremely brief sketch of the evolution of modern industry, in order that a better perspective may be obtained of the present industrial situation. That there do exist many wrongs and abuses which can, and should, be righted, is undeniable; but to do this it is essential that both Capital and Labour should meet in a sympathetic and tolerant spirit in an endeavour to understand each other's difficulties. Employers must be prepared to adapt themselves to the constantly changing conditions of industry, and to recognize the right of the workers to be considered as something more than mere tools, or just cogs in the great industrial machine. With the remarkable developments that have taken place during the last half-century in scientific invention, in education, in the altered relations of employers and employed, and the rapid growth of democratic institutions, Labour feels—and probably in some respects justly feels—that it is denied the opportunities and responsibilities of a free class.

An immense amount of industrial trouble to-day is caused by mutual suspicion. The workers regard their employers as essentially self-seeking and selfish; their sole object being the exploitation of Labour. Employers, on the other hand, find their activities and enterprise restricted by the obligations imposed upon them of constantly being on the alert against possible attacks by the workers' unions. While it is difficult to apportion the blame for this state of affairs, the fact should be kept in mind that usually the worker is not encouraged or rewarded in his work by any means other than by wages (and these nowadays usually settled by his trade organization), even though the firm by whom he is employed enjoys an increased prosperity which may be due in some degree to his efforts. The usual practice is to allocate all surplus profits entirely to Capital; and it can hardly be wondered at if the worker should consider himself exploited or feel aggrieved, and seek by means of his trade organization to secure a greater share of the reward of industry. It has been said that the payment of wages in return for labour merely purchases the time of the labourer, and does not purchase or secure in any way an intelligent interest in his work, or any desire for the prosperity of his employer.

WHAT IS THE REMEDY?

One, then, is naturally led to ask: "What is the remedy for this state of affairs? How can employer and employee be brought together to give of their best to secure that greater and more efficient production which is so essential to the maintenance of the trade supremacy of the country?" My own experience, extending over very many years, has convinced me that the only solution of this problem of Capital and Labour lies in the application of co-partnership principles to industry. I would, however, here differentiate between mere profit-sharing and co-partnership. In this connection, I cannot do better than quote the words of my predecessor, the late Sir George Livesey:

> Simple profit-sharing—the payment of the annual bonus in cash—is a failure, because it does not permanently benefit the recipients, or the great majority of them. A few make good use of the bonus by saving; but generally it is spent as it is received, and instead of encouraging thrift it does exactly the reverse. If the position of the wage earners, and of some others, is to be improved, it is essential that they should become owners of property; and for the majority of workmen profit-sharing co-partnership is the only practical way. By giving the profit-sharing bonus either wholly or at least half in stock (instead of cash) the object can be—is, in fact—attained. If co-partnership is worked with the object of benefiting the employees, the benefit of the employer follows naturally and certainly.

The object of co-partnership is to give the employee a real and active interest in the business, while in profit-sharing the only interest he has is a cash one. On this point, the testimony of a labour organization—the American Brotherhood of Locomotive Engineers—is interesting:

> When a wage earner invests some of his earnings in the business enterprise in which he himself is employed, he becomes a better workman; he takes a new interest in the business; he feels that he has a stake in it which is more important than the weekly pay envelope. And when a man gets this feeling, he settles down and becomes dependable. For he comes to feel that he also has a part in the prosperity and progress of the country which places upon him the obligation of industry, of thrift, and of good citizenship.

CO-PARTNERSHIP.

The idea of co-partnership is not a new one In 1829 a scheme is recorded by which a farm was let and capital advanced to some labourers, who worked it on co-operative lines. Since then a large number of schemes, either on profit-sharing or co-partnership lines, have been put into operation; but many have failed owing to the non-observance of one or more of the vital principles of co-partnership. As I have said before, a mere cash bonus is not the best means of securing the co-operation of Labour. Payment of wages even slightly lower than recognized rates would inevitably prejudice the success of any co-partnership scheme; and any conditions in a scheme which interfere with employees' rights to join trade or other organizations will prove equally fatal. Successful co-partnership demands good faith, goodwill, and absence of suspicion on both sides. A scheme of co-partnership, to be successful, must contain three vital principles; and these can be shortly summarized:

(1) A share in profits.
(2) A share in capital.
(3) A share in control and responsibility.

Employees must be real partners who, after the investors have received a fair remuneration on their investment (and what is fair must depend upon the nature and risks of the business of the undertaking), share any surplus profits with those who have put their money into the business. This partnership should, if possible, be of a definite duration, as in an ordinary partnership. If these essential conditions be observed, there is no reason why a scheme of co-partnership in ordinary circumstances could not be applied to any of the staple industries of the country.

SOUTH METROPOLITAN GAS COMPANY'S SCHEME.

I now pass to the co-partnership with which I am most closely identified—namely, that of my own Company, the South Metropolitan Gas Company—and in order that a clear idea of the scheme may be obtained, I must briefly refer to the circumstances associated with its adoption.

The Company is a statutory one—that is, it was created by a Special Act of Parliament which defines its powers, obligations, and privileges. From time to time, in order to meet altered conditions, recourse has had to be made to Parliament for further powers; and these Acts constitute the charter under which the Company works. In 1876 Parliament decreed that all new capital should be obtained by public auction or tender, and should not, as had before been the case, be offered to existing shareholders. The amount of any premiums obtained was to be applied to capital purposes, but not to bear interest. The effect of this was to give to the gas companies' customers an opportunity of becoming shareholders; and this was the first step towards establishing a community of interest between the Company and its consumers. The consumers

were protected by the Act which prescribed a standard quality as well as a standard price for the gas, and the shareholders received a variable dividend rising or falling as the price of gas fell or rose. So that both the consumers and shareholders benefited by economical and efficient working—the one by a lower-priced gas, and the other by an increased dividend. The other agent in economical production—namely, the employee—was, however, left out; and an unsuccessful effort was made in that year (1876) by Mr. (afterwards Sir) George Livesey, the then Secretary and Engineer of the Company, to remedy the omission.

March, 1889, witnessed the formation of the Gas Workers' Union, some of whose demands from time to time upon the South Metropolitan Gas Company were granted. These demands in due course became more exacting; and it was felt by the Directors of the Company that some additional means should be devised of reconciling the interests of the men with those of the Company. This induced Mr. Livesey, who in the meantime had become Chairman of the Company, again to bring forward his previous proposals to enable the employees to benefit, in addition to the consumers, by the prosperity and economical working of the Company; and a scheme was formulated. The assent of the Directors was obtained, and the scheme submitted to all regular employees. The plan proposed was to give the employees a bonus of 1 p.ct. on their year's wages for every penny reduction below 2s. 8d. per 1000 c.ft. (the price then being 2s. 3d.); and in addition there was to be placed to the credit of every man who would accept the scheme a sum equal to what he would have received as bonus if the scheme had been in force during the previous three years—a "nest egg."

The employee was required to sign an agreement to work for the Company for twelve months at the current rate of wages; the Company agreeing to employ him during that period, and undertaking that no alteration should be made in wages to his disadvantage. The money credited to the employees under the scheme was not to be withdrawn during the first five years, except in the case of death, superannuation, or leaving the service of the Company, but was to remain on deposit with the Company at 4 p.ct. interest.

A number of alterations were made as a result of a meeting between the representatives of the men and the Directors, and within a week about a thousand of the Company's employees signed the agreement, which number, however, included only three stokers. On the ground that it would weaken the collective bargaining power of the men, the Gas Stokers' Union insisted that the scheme should be abandoned, and that the men who had accepted the scheme should be removed from the works. Practically the whole of the stokers, numbering 2000 men, came out on strike on Dec. 12, 1889, to enforce these demands; but their places were filled, and the strike speedily came to an end.

Various alterations have taken place since that time. By the South Metropolitan Gas Act of 1896, the starting-point of the scale was 3s. 1d. per 1000 c.ft., with a standard dividend of 4 p.ct., increased by 2s. 8d. p.ct. for every penny reduction in the price of gas below 3s. 1d., and to the employees a bonus of ¾ p.ct. on the amount of their annual wages for every such reduction. Of the amount credited to the account of each man, one-half was required to be invested in the Company's stock, and the other half to be left in the Company's hands to accumulate at interest; or in special circumstances it could be withdrawn by giving a week's notice. So that the basic principle of the system was a fair price to the consumer, a fair price for labour, and a fair price for the use of capital. Any economies or savings effected as a result of better and more efficient working were divided as between the three partners—by lowering the price of gas to the consumer, increasing the dividend of the shareholder, and giving a bonus on his wages to the worker. It is obviously to the interest of all three partners that the commodity should be produced as cheaply as possible, and the undertaking be conducted on the most enlightened business lines.

The scheme as outlined above worked to the complete satisfaction of all the partners up to the war period. Owing to circumstances over which the Company had no control—coal, the principal requirement, having trebled in price, the cost of labour also trebled, and material necessary for repairs and maintenance costing from 200 to 400 p.ct. more—the price of gas had to be increased, until it reached a figure of 4s. 8d. per 1000 c.ft. The effect of this was to penalize the shareholders and employees as though the Company had been guilty of bad management. Whereas before the war the shareholders' dividend was for several years 5½ p.ct., a Relief Act passed in 1918 permitted payment of no more than 3 p.ct. per annum to the shareholders. The employees' bonus, which before the war had reached 9¾ p.ct. upon the amount of their annual wages, completely disappeared. It could not have been expected that a scheme designed to apply to times of peace should work with justice when values so considerably altered.

Means had therefore to be found to reconcile the interests of the three partners under the conditions which followed the great war; and in 1920 Parliament passed an Act promoted by the Company to effect this unification. While the old scheme was slightly modified by the new one, the essential principles were preserved—namely, a fair price to the consumer, a fair price for labour, and a fair price for the use of capital. The price to the consumer and the rate of remuneration for the use of capital are specified in the Act; while the rates for labour, of course, are those current in the district. After providing for these three essentials, any surplus profit is divisible between the consumers, shareholders, and employees, in the proportion of three-quarters to the consumers by way of reduction in the price of gas, one-eighth to the shareholders as increased dividend, and one-eighth to the employees as bonus on their wages.

A present aspiration of Labour is that it should have a voice in the affairs of the industry whose wealth it helps to produce. This aspiration was, so far as the South Metropolitan Gas Company was concerned, given effect to as far back as 1889. A Committee, known as the Co-Partnership Committee, was formed, having a number of representatives elected by the workers themselves and an equal number of nominees of the Board of Directors. The number of representatives now comprising this Committee is 72. The Committee meets monthly—more frequently, if desired. It appropriately deals with many matters which, if neglected, might give rise to dissatisfaction. Matters are discussed which relate to conditions of work, in addition to questions affecting individual workmen and the Company, and the administration of various funds (sickness, accident, and others). In consultation with this Committee, questions affecting rates of wages, and any changes thereof, are agreed, as well as other things affecting the welfare of the employees as a whole. Any grievance, fancied or real, can thus be ventilated, and disaffection by this means be avoided. During the war the subject of wages adjustments was a frequently recurring one; and the members of the Committee proved their usefulness in keeping the Company accurately informed of the effect of the increasing cost of living upon the circumstances of the workers, and in conveying to the employees an understanding of the difficulties which, at the same time, faced the Company.

In 1898 representation of the employees on the Board of Directors was provided for by the election of two of their number to seats on the Board, and a year or two later a representative of the official staff was also added. The interests of the workers and their influence on the policy of the Company are therefore assured, right up to the Directorate of the Company.

Results of Its Working.

Such is the brief history and organization of the co-Partnership of the South Metropolitan Gas Company. A few particulars of the results of its working may be of interest.

It has been suggested that the results of co-Partnership are not sufficiently immediate to act as a real incentive to Labour. An effective answer to this can be found in the fact that our employees at the present time own nearly half-a-million pounds of ordinary stock. No distinction is made between the stock allotted to the employees and that held by the investing public, so that voting power conferred by this amount of stock is also held by the employees; and, of course, the dividend paid is the same. In addition to this holding of the employees, the Company also holds on their behalf savings (accumulated bonus and other savings) to the amount of nearly £200,000, upon which interest is allowed.

During the war the spirit of co-Partnership was admirably manifested. Immediately on the declaration of war, the Co-Partnership Committee met, and, following the precedent set during the South African War, invited subscriptions to a war fund inaugurated for augmenting the allowances of dependents of those employees who joined His Majesty's Forces. The entire management of the fund was vested in a Sub-Committee of the main Committee, and in all a fund was raised by weekly subscriptions which totalled £130,000, and was distributed in weekly allowances from August, 1914. Out of the total number of 6620 employed by the Company prior to the war, 2220, or 33 p.ct., joined H.M. Forces, while at November, 1918, the number who had joined was 3745; but this included those who had entered the service of the Company after August, 1914. Owing to this depletion, women had to be employed and trained, the number of whom at one time reached over 2000. This dilution and training was rendered the more easy by the ready assistance given by all classes of workers; and in this, as in many other instances, friction was conspicuous by its absence. In all the heavy obligations which the Company undertook for Government Departments during the war, the willing co-operation of every employee was at all times forthcoming; and during the whole period the loyal spirit of co-Partnership was fully maintained.

It should be stated that entry into the co-Partnership is quite voluntary, and no discrimination is made regarding union or non-union men. Each retains his individuality, and receives the current rate of wages for his trade. From the practical experience of co-Partnership which has been acquired over 36 years, it can with confidence be said that it has successfully solved the problem of unifying the interests of consumer, worker, and shareholder, and has resulted in more efficient

working and an absence of suspicion which would otherwise not be possible.

Objections Answered.

I should like now, in a general way, to deal with some objections which have from time to time been made to co-Partnership. It is sometimes stated that the bonus would have to be greater than it usually is if co-Partnership is to be a success. Well, where Capital receives a fair remuneration, and Labour gets its fair wage as well as representation in the management, the amount of bonus and additional dividend is limited by the amount of surplus profits to be divided. Sir George Livesey used to say that it was the first £20 which was the trouble. The fact that at the present time 6774 co-partners of the South Metropolitan Gas Company hold £471,460 of ordinary stock, is a sufficient refutation of the argument as to the inadequacy of the amount of the bonus.

Another objection is that the principle of agreements prevents men striking simultaneously, or in puttting forward organized demands for better working conditions. In this connection, if the workers felt they were treated unjustly, no agreement would hold them to their employment; and in our long experience our employees (union and non-union) have been willing—nay, anxious—to sign agreements. Again, it is said that co-Partnership restricts the mobility of Labour. As a matter of fact, mobility is increased, inasmuch as the possession of Capital makes the possessor more independent and certainly more mobile. Many of our employees have been enabled to emigrate, or to buy their own houses, and in some cases to set-up in business for themselves.

I cannot here deal with objections which arise out of an ostensible desire to overthrow the present industrial system, an instance of which was shown during the Trade Union Congress at Scarborough in September last, when, during a debate on co-Partnership, a speaker declaimed against "the £100 millionaire;" nor even with the resolution which was subsequently passed warning "the workers against all attempts to introduce capitalist schemes of co-Partnership, which in the past have failed to give the workers any positive rights, but instead have usually served as fetters retarding the forward movement." Co-Partnership is evolutionary, and not revolutionary; its principle being, not to destroy, but to widen the basis of the existing system by enabling the workers themselves to become capitalists. True trade union objects are not incompatible with those of co-Partnership, but, on the contrary, they are in many respects identical; and our own experience proves that unionists are as keen to accept co-Partnership as are non-unionists.

Although the fact is not always recognized, the prosperity of employees as a class must always be bound-up with the prosperity of their employers. Sir George Livesey said:

> It is no true co-partnership if it does not benefit both employed and employers financially; for much of its success must be due to the employer, who not only initiates it, but on whom also mainly depends its proper and successful working. It is therefore quite fair that he should benefit equally with his workmen; and my experience is that they are content it should be so.

Mr. Will Thorne, M.P., in his recently published reminiscences, refers to his union's struggles with the South Metropolitan Gas Company, and says:

> It was a costly and unsuccessful strike; the Union paying out over £20,000 in strike pay, and other expenditure. We had the satisfaction, however, of knowing that it cost the Company in the neighbourhood of a quarter-of-a-million pounds.

Whether the figures be right or wrong, it is a curious mentality that finds satisfaction in such an unproductive expenditure. That much of the money devoted by Labour to unproductive purposes could be used in peacefully securing for itself those things for which it now fights, is shown by Dr. Bowie in a paper he read at Oxford last September. He says:

> If the Miners' Federation had used the contributions of its members, since its formation, to buy up the mines, every pit, with all equipment, would be theirs to-day; indeed, they could have secured complete control long before the war. But not only have they thrown that £200,000,000 of miners' earnings into the sea of industrial strife, they have thrown another £200,000,000 at least after it, in loss of wages during disputes. In direct loss to the community they have at least thrown away a sum four times that amount. So, on a conservative estimate, the Miners' Federation—that is, the general body of miners—have served their own interests by losing a sum double the present value of the entire British coal mining industry. Further, they have robbed the nation four times of the total present value of its coal mining properties.

I suggest that the ideals of industry could be shortly summed-up in the words "Progress and Efficiency," and that the objects of industry should be to produce commodities, or to render services, which the community requires at a price it can afford, or is willing, to pay. This price must to a certain extent determine the rate of wages of the labour and the rate of remuneration for the use of capital. Is it too much to expect that the average working man, in return for a share in any surplus profits and a voice in the management of the undertaking, will avoid waste of time and material, take an intelligent interest in his work, and give his employer willing service and a sympathetic spirit; or that Capital will be prepared to undertake increased risks in the hope of receiving a greater reward for its use—both Labour and Capital working together to secure a reduction in costs of manufacture to encourage an increased demand? The remuneration of both Capital and Labour comes from the product of their joint efforts; and if by any restrictive action on the part of one or both, production is diminished or increased in cost, there is so much less to be divided. Conversely, efficient working means better results.

The interests of Capital and Labour are identical; and this identity is not only recognized by co-Partnership, but is given practical effect to in every real co-Partnership which gives Labour a share in the profits and responsibilities of industry.

TENTH IDEAL HOME EXHIBITION.

A Brilliant Display at Olympia.

Already in previous years the organizers of the "Daily Mail" Ideal Home Exhibition at Olympia, and the exhibitors, have set themselves a high standard; but in the tenth of the series, which was opened yesterday morning by H.H. Princess Marie Louise, they have created for themselves a new record. The exhibition will remain open until March 27, and will be hugely patronized. Indeed, the only fear one can feel regarding it is that it may prove too popular.

Gas is, of course, represented—notably by the London Gas Exhibit, in which the seven great London Companies have, as before, co-operated. Their display is once more outstanding, in an exhibition which contains many prominent features; but an indication of its main points is perforce held over until the next number of the "Journal." There is much to be seen at different stands in the way of apparatus for heating water by gas. The use of gas with boilers for central heating and hot water supply is demonstrated by Messrs. Thomas Potterton, and the convenience of the geyser for meeting other requirements by Messrs. Ewart & Sons, Ltd. Several firms exhibit gas cookers; and other appliances of domestic utility, needing a gas supply, are also to be seen.

Generally, it may be said that the present exhibition presents fresh aspects, and contains some entirely novel features. A new note in display is made at the Addison Road entrance, where is the Court of Fine Furniture—a nobly proportioned group of golden-domed pavilions set around fountain gardens. On one side of the grand stairway at the other end of the main hall is the all-gas house above referred to, while on the other side is the all-electric house. The gardens in the annexe are as enchanting as usual; and in the new hall are ten full-sized furnished houses for all to explore. The types range from a £90 bungalow to a mansion; and all the structures have effective gardens.

The exhibits in the galleries of the main and the new halls are of exceptional interest. There is a very comprehensive review of the latest labour-saving inventions for eliminating domestic drudgery, and new ways making for ease and efficiency in the home. A fascinating row of structures is provided by the century-old kitchens of the nations, peopled by native women in costumes of the period, and, by way of contrast, an up-to-date American apartment where a negress cooks New England dishes. In the handicrafts section, the workers of fourteen countries show typical art and craft products; and there are working demonstrations of spinning, hand-loom weaving, pottery, modelling, lacquer, basket work, and the making of articles in metal, wood, and leather.

The Theatre of Furnishing is an original feature of the exhibition. Upon a stage in the concert hall, three times a day, is enacted a presentation of furniture from early Tudor times to the present day. The romantic stories, in historical settings, of the great craftsmen of the past and their patrons are portrayed in a series of cinematograph films. These pictures are followed by scenes set on the stage, when rooms relating to the film story are completely furnished before the audience; and the lecturer, in the course of each film and in the setting of the stage, makes the audience familiar with the detail and beauty of the furniture before them.

GAS PUBLICITY AT CARDIFF.

Better Housing and Housekeeping Exhibition.

One of the most successful exhibitions held in Cardiff was the "Western Mail" Better Housing and Housekeeping Exhibition which was opened on Feb. 9 by the Lord Mayor of Cardiff (Alderman W. B. Francis).

The Cardiff Gas Light and Coke Company took the opportunity of using this exhibition for progressive propaganda work, and invited the makers of gas appliances to co-operate with them in giving a forceful illustration of the usefulness of gas in connection with housing and household problems. The appeal was readily responded to, sixteen makers taking space in the hall. All the stands were made by the Company at their works, so that there should be uniformity throughout. It was realized that, with the large number of makers exhibiting, the Gas Company's stand could be devoted purely to propaganda work; and for this purpose it was divided into four sections, so that each side of the stand could demonstrate a different phase of the Company's activities.

A special feature was made of the Company's policy of pushing the sale of graded coke within their area of supply; and on the coke side of the stand the four grades supplied were shown with descriptive cards, besides which two coke water-heaters were shown. The main attraction, however, was this smokeless fuel burning beautifully in an "N.C." fireplace. This practical demonstration resulted in hundreds of sample orders being secured, and many inquiries for bulk supplies.

Another section was devoted to sulphate of ammonia and prepared tar for woodwork and path-making; and for this purpose a small lawn was laid, with a path constructed of the material which was being advertised, and woodwork was shown which had been treated with a special tar. Arranged on the stand were 7-lb. and 14-lb. bags of sulphate; and 2, 5, and 10 gallon drums of prepared tar. Great interest was aroused by these products.

The exhibit on another side of the stand conveyed to consumers the value of coal carbonization, with the recovery of by-products. A suggestion of the "B.C.G.A." was carried out for this section; the background being painted in rainbow rays of colour, in front of which stood the well-known poster cut-out, the "Spirit of Coal." Bottles displaying the products were arranged in the front, with information prominently in position. A surprising amount of interest was shown in this section, and a great deal of information indicating service which gas authorities are rendering in this direction was disseminated.

The remaining side of the stand was fitted with machinery lent by the makers of "Veritas" mantles—Messrs. Falk, Stadelmann, & Co., Ltd.; and actual demonstration was given of the manufacture of incandescent mantles.

One of the most important features of the exhibition was the series of lectures on the efficient use of the gas cooker, by Miss M. K. Gompertz, who lectured at the British Empire Exhibition. On several occasions the seating accommodation was fully

The Coke Exhibit.

The Products Stand.

taxed, when about 400 people listened intently to the interesting facts Miss Gompertz imparted. Indeed, so keen was the interest that the Company found it necessary to retain Miss Gompertz's services after the exhibition had closed, in order to meet the many ladies who had asked for further information.

THE EXHIBITORS.

The exhibits of the appliance manufacturers, a list of whom follows, were all exceedingly well arranged. Arden Hill, & Co.; Clark's Syphon Stove Company, Ltd.; the Davis Gas Stove Company, Ltd.; W. H. Dean & Son, Ltd.; Ewart & Son, Ltd.; Falk, Stadelmann & Co., Ltd.; Fletcher, Russell & Co., Ltd.; General Gas Appliances, Ltd.; R. & A. Main, Ltd.; the Nico Light Company, Ltd.; the Parkinson Gas Stove Company, Ltd.; Radiation Limited; the Richmond Gas Stove & Meter Company, Ltd.; the Thermal Syndicate, Ltd.; Wilsons & Mathiesons, Ltd.; and John Wright & Co.

At the Exhibition.

RIGHT TO LEFT: Mr. R. J. Auckland, A.C.I S. (Secretary), and Mr. H. D. Madden, M.Inst.C.E. (Engineer and Manager), of the Cardiff Gas Light and Coke Company; Sir William Seager, D.L., J.P.; Mr. James Miles, J.P. (a Director of the Company); Rev. D. T. Thomas (Rector of Canton, Cardiff); Mr. Robt. Webber, J.P. (General Manager, "Western Mail"); the Lord Mayor (Ald. W. B. Francis); Mr. John Allcock (City Treasurer); the Lady Mayoress (Miss Francis); and Mr. Lawrence G. Williams (a Director of the Company).

"DAILY MAIL" MISSION TO U.S.A.

The gas industry, in common with other industries, has followed with interest the project of the "Daily Mail" in sending a number of representative British workmen on a mission to the United States to visit the most up-to-date engineering establishments in that country, and to study at first hand the conditions with regard to wages, hours, and use of machinery. The mission comprises a representative from the following occupations: Constructional ironworker, iron moulder, machine man, turner, pattern maker, blacksmith, fitter, and tool turner and fitter.

Each man has been chosen by the Trade Union to which he belongs; and the party—which sailed from Liverpool on Feb. 27—is accompanied by Mr. William Mosses, O.B.E., J.P. (formerly General Secretary of the United Pattern Makers' Association, and General Secretary of the Federation of Engineering and Shipbuilding trades), as Industrial Adviser.

Mr. J. T. Kay, of the Parkinson Stove Company, Ltd.

It is pleasing to note that the gas industry is represented on this mission in the person of Mr. J. T. Kay, an iron moulder employed by the Parkinson Stove Company, Ltd., of Stechford, Birmingham; and the Company are to be congratulated on providing a man who, by reason of his experience and efficiency, is qualified to represent the iron moulders of Great Britain.

Mr. E. H. Gill (Head, Wrightson & Co., Ltd.) represents the constructional ironworkers; and Mr. T. Murray (G. & J. Weir, Ltd.) the pattern makers.

To Mr. Kay and the other members of the party this opportunity of studying American industrial methods and their economic effects, and of comparing these with the conditions with which they are familiar at home, should prove both interesting and instructive.

Manufacture of Carborundum.—An explanation of the method of manufacture of carborundum was given recently by Mr. F. W. Higgins, in a paper which he read before the Manchester Association of Engineers. At the present time the annual production is upwards of 30,000 tons; and it is manufactured in electric furnaces of the resistance type. The furnace charge consists essentially of silica, sand, and finely ground petroleum coke, to which are added small amounts of sawdust and common salt Preparing for a run, the mixture is fed into the furnace until it is about half-full, and a trench is then made from end to end, which is filled with granular coke. The coke forms a core which makes connection with the electrodes at either end, and constitutes the resistor. The furnace is then filled with the remaining mixture, and the power turned on. A current of 10,000 amperes is transmitted through the core, which is thereby raised to an incandescent heat, and, in turn, radiates that heat to the surrounding mixture. As the temperature increases, the reaction between the coke and sand proceeds, with the resultant building-up of a ring of carborundum crystals surrounding the core.

DOMESTIC HEATING.

Discussion at the Royal Society of Arts.

[A paper on "Domestic Heating," read by Dr. Margaret Fishenden at a meeting of the Royal Society of Arts on Feb. 24, was followed by a discussion of considerable interest. Dr. Leonard Hill stated that the carbon dioxide bogey in relation to heat comfort is neither more nor less than a myth, and that talk about organic impurities exhaled by human beings is beside the point. Air stagnation, and gross pollution by dust and smoke particles, are the factors that really matter. Dr. Hill is of opinion that monotony is a thing to be avoided in heating systems, and suggests that every endeavour should be made to render the gas fire—a highly efficient heating agent—as mobile as possible.]

That the subject of domestic heating is attracting more and more attention was indicated by the large number of people who attended a meeting of the Royal Society of Arts on Feb. 24, to hear and discuss a paper by Dr. Fishenden, who is attached to the Fuel Research Division of the Department of Scientific and Industrial Research. Dr. Leonard Erskine Hill, F.R.S., presided. The paper was a long one; and what follows is only a brief abstract.

DOMESTIC HEATING.

By Dr. Margaret Fishenden.

[Abstract.]

At the outset it was mentioned that there are many widely different angles from which the problems of domestic heating may be surveyed. The architect or builder is concerned chiefly about the capital cost of alternative equipment; what looms largest in the householder's mind is the running cost of appliances; while, to the nation, the expenditure of energy estimated in terms of initial coal consumption is the most important aspect. Then followed a short history of the development of domestic heating from the time when fire was produced by rubbing together pieces of wood, and wood, grass, and vegetable refuse were the usual fuels, to the present day.

In this country, said Dr. Fishenden, where natural gas and natural oil are practically non-existent, and where water power resources capable of economic development are very limited, we are likely for an indefinite period to be dependent for both heat and power upon coal and its derivatives, including gas and electricity. The expenditure of energy entailed in the use of any given fuel must consequently be considered in relation to the initial coal consumption involved in its production.

Notwithstanding the advances which have been made by gas and electricity for household use, domestic heating is still carried out mainly by burning coal in open grates—a state of affairs greatly to be deplored. The proper course is to subject all raw coal to some form of preliminary treatment whereby the bye-products can be preserved. This is fulfilled by the process of carbonization carried out at gas-works. The British gas industry deals annually with about 18 million tons of coal, which yields nearly 300,000 million c.ft. of gas. The greater proportion of this, however, is absorbed for lighting, heating, and cooking. By employing coal as a source of power for the generation of electricity, energy which can be utilized without the production of smoke or dirt is rendered available; but in this case the bye-products of the coal are not recovered.

Efficiency of Gas Production.

When coal is subjected to any transformation process whereby its energy is converted into some other form, thermal loss is unavoidable. In gas manufacture the loss is equivalent to 20 to 25 p.ct. of the potential value of the coal treated. The thermal value of the saleable gas is about 25 p.ct., of the coke 45 to 50 p.ct., and of the tar 5 p.ct. For many purposes, said the lecturer, gas coke is a satisfactory substitute for raw coal; and if it is assured that there are convenient outlets for the coke produced, the effective weight of coal expended in the gas-making process may be regarded as only 50 p.ct. of the actual amount dealt with. Here the thermal efficiency of gas production becomes 50 p.ct., or, taking into account tar, 55 p.ct. Calculations of the inroads into our national fuel supplies consequent on the substitution of gas for solid fuel must be based on this figure,

At present a high-grade household coal may be bought for 1·7d. to 2·1d. per therm (45s. to 55s. per ton); gas coke for (say) 1·5d. to 1·9d. per therm (35s. to 45s. per ton); and coal gas for 8d. to 12d. per therm. These are the figures upon which estimates of running costs to the householder must be based.

Electricity and Thermal Waste.

The thermal waste associated with the generation of electricity from coal is far more serious than that consequent on carbonization, though it is possible to make use of lower-grade coals. The loss is about 87 p.ct. of the initial heat value of the coal used. Such a shrinkage of raw material is bound to result in a very highly priced product. Except where advantage can be taken of a special tariff, about 59d. per therm (2d. per unit) is the average price paid by the householder for electricity applied to heating purposes.

It follows that, at the prices quoted, the costs of a given number of potential heat units in coal, gas, or electricity are in the ratio of 1 : 5·3 : 31, while amounts of coal involved in their production are in the corresponding ratio of 1 : 1·9 : 7·7. Since, however, it is never possible in practice to utilize the whole of the energy theoretically available, but only a proportion, which is far less for coal than for gas or electricity—or, in other words, since the efficiency of coal burning appliances is much inferior to that of gas or electrical alternatives—these figures must be considerably modified in order to arrive at a true comparison of the relative costs of equivalent heat production.

Dr. Fishenden then dealt at considerable length with the heat requirements of human beings. A temperature of 62° to 66° Fahr. is required for continued sedentary work, though for short periods somewhat cooler surroundings may be found comfortable. Some 75 p.ct. of the body heat is dissipated by radiation and convection. Calculation shows this to be consistent with a surface temperature of about 75° Fahr. Thus, if the walls, &c., of a room were raised to 75° Fahr., the radiation losses from the occupants would be *nil*. To bring about comfort, the air temperature would have to be reduced to 50° Fahr. Alternatively, if the walls fell from 75° to 64° Fahr., the air temperature associated with comfort, in the absence of any considerable draught, would rise from 50° to 64° Fahr.

In the absence of any surface at a relatively high temperature, rooms must be maintained at about 64° Fahr. to keep sedentary workers warm. Considerable variations in the relative humidity will not then have any noticeable effect upon sensations of comfort. Experiment has shown that undesirable conditions are created when the walls of a room are relatively cold, even though the air may be warm enough to prevent any sensation of cold. It is probable that moving air in conjunction with radiation is healthier than warm still air. Dr. Leonard Hill has stated that it is of first-rate importance that the air at head level should be relatively cool, and that warm feet with ample ventilation at breathing level is the ideal to be striven for.

Coke for Central Heating.

For central heating, no fuel can compete with coke in economy, whatever the basis of comparison. Small coke-fired boilers, such as are used for small radiator installations, give an efficiency of about 50 p.ct. in water heating. In addition, convection from the exterior surfaces of the stove may be usefully employed if the warm air has access to the building. In such boilers, neither coal nor anthracite can do much better than coke, and both are dearer. Gas, for air heating, whether through the medium of radiators or stoves, or directly from open flames, gives an efficiency of 80 to nearly 100 p.ct.—the former figure applying to small gas boilers, the latter to flueless gas heaters of any type. Electrical methods also give practically 100 p.ct.

At the present time the prices of equivalent numbers of heat units in coal, coke, gas, and electricity are in the ratio of 1 : 0·9 : 5·3 : 31. Assuming 100 p.ct. efficiency for gas or electricity, and 50 p.ct. for coal or coke, the cost to produce any given effect becomes 1 : 0·9 : 2·6 : 15·5. The use of electricity for continuous air heating would quadruple the effective coal consumption.

There are few instances where extra convenience or reduced labour would be regarded as adequate compensation for such serious discrepancies in cost to the householder as are found between raw coal and gas or electricity for central heating purposes. The derivative fuels are better adapted to intermittent heating.

At this stage the lecturer drew attention to the "panel" system of heating, which has been applied to a number of large buildings. It is claimed to be cheap and comfortable. The method depends upon the maintenance of a relatively large patch, such as a ceiling or wall, at a temperature (say, 80° to 120° Fahr.) not greatly in excess of that of the remainder of the room, by the circulation of hot water through pipes buried in the plaster.

Radiation from Coke Stoves.

For a surface temperature of only 200° Fahr., radiation and convection from a coke stove would be approximately equal. It must, therefore, be borne in mind that the low radiating value of coke stoves is due to the low rate of consumption required, rather than to any diminution of the radiation efficiency as compared with that of open coal or coke fires. The radiation is less intense, but the radiating surface is considerably extended, and its effect in positions nearby should allow of a reduction in the room temperature needed for comfort.

Concerning the open fire, the radiation efficiency of commercial grates burning coal generally lies between 15 and 25 p.ct., though deeply-recessed dog grates with low overhanging

canopies and high kerbs, or grates which are wide from back to front, may give lower values. In addition there is a gradual creep of heat from the hot flue through the wall into the room, but this does not generally amount to more than a very small percentage of the heat of the coal used.

GAS FOR INTERMITTENT HEATING.

Up-to-date gas fires, on the other hand, give thermal radiation equivalent to 50 p.ct. or more of the theoretical heat of the gas used. Electrical heaters give nearly 100 p.ct. efficiency. On the basis of equal heat production, gas fires are about twice, and electric heaters about seven times, as dear as coal fires. The cost of coke is about three-quarters that of coal. There are, however, many cases in which this unfavourable comparison is considerably modified, since it is not for continuous heating that gas or electricity shows to advantage. Suppose that a room is used intermittently for a total of four hours a day. If, to meet the needs of the case, a coal fire must be maintained for 16 hours a day, even though the rate of combustion were cut down to one-half when the room was unoccupied, a demand equivalent to a full rate over ten hours would have to be met. On the other hand, gas or electric heating would extend only over the four hours of actual occupation. Thus the cost of gas would be reduced to about 0·8 times the cost of coal; while electricity would cost about three times as much as coal.

GAS FIRES AND COAL CONSERVATION.

From the aspect of coal conservation, said Dr. Fishenden, gas fires compare satisfactorily with open coal fires even for continuous heating. For intermittent use, their substitution for coal fires would be a great saving of our natural fuel supplies. The high efficiency in use of electric heaters again fails to compensate for the low thermal efficiency of generation; and for continuous heating their use in place of open grates would result in nearly twice as much coal being used at the power station as would suffice if burned directly in a room.

As a rule, if one can conveniently get within 5 or 10 ft. of a coal fire burning 2 lbs., a gas fire burning 30 c.ft., or a high-temperature electric radiator taking 2 units per hour, room temperatures of 55° to 60° Fahr. will suffice for sedentary occupation.

Dr. Fishenden concluded her paper by saying that there are probably real grounds for our national love of the coal fire. The non-uniformity of its effect, though usually accounted a disadvantage, may actually be stimulating physiologically. The possible solution of the smoke problem would appear to lie in the elimination of raw coal from our houses, and its substitution by coke, gas, and electricity, each in the cases to which it is best fitted.

Discussion.

STAGNATION TO BE AVOIDED.

The CHAIRMAN said that Dr. Fishenden, whose paper was characterized by its fairness, had carried out much admirable research work on the subject of heating—a problem which was of first-rate importance from the point of view of the health of the nation. There was a tendency, he thought, to overheat rooms, which was not at all beneficial. With regard to heat comfort and hygienic conditions, a large amount of attention was paid to two factors which were in reality absolutely negligible. He referred to the talk about the carbon dioxide content of the atmosphere and the organic impurities exhaled by human beings. The two factors which did matter were the gross pollution of the air by dust and smoke particles, together with microbes, which caused catarrhs and influenzas, and stagnation. Moist stagnant air was particuarly harmful, for it lowered the heat production of the body. What they should aim at was to rid the air of smoke, which acted as a curtain to the ultra-violet rays of the sun, the beneficial effects of which were enormous. He agreed with Dr. Fishenden in the concluding remarks of her valuable paper. A coal fire did avoid monotony; and this was a desirable feature. Gas fires, he said, should be as mobile as possible, so that two, four, or more radiants could be in use as desired. Indeed, to avoid the monotony of gaseous heating, at one time he invented a clock which altered the gas supply to the fire at intervals. The gas fire, he emphasized, was a most efficient heating agent; and provided it was properly flued, it had no harmful effect whatever on the atmosphere of the room in which it was fitted. There was no reason why a spherical gas fire should not be placed in the centre of an apartment, having a slender flue which, passing along the floor of the room above, would serve to heat the latter. To his mind, convected heat was not suitable for ordinary domestic heating. What was needed was radiant energy.

INVESTIGATION OF AN ALL-GAS HOUSE.

Mr. A. H. BARKER suggested that variations in the temperature of the body were greater than was commonly believed, and that if it was possible to determine the total heat, this too would vary considerably. Skin sensation, he thought, had a great deal to do with heat comfort. If a person who felt warm stood ten or fifteen feet away from a block of ice, this was sufficient to dispel any such feeling. About fifteen years ago he had noticed that in a house where all the rooms were at the same temperature, one appeared to be warmer than the rest. On investigation, he discovered that this particular room had the advantage of the slight radiation effect from a chimney flue. This radiation, though small, was sufficient to affect comfort in a marked degree; and his investigation had led to the patenting of what was known as the panel system of heating. The fuel consumed for this system was only half that required for radiators. Thermometer readings were really no guide at all to heat comfort conditions. For example, he had the panel method of heating in his own house; and in the dining room, where the ceiling was heated to a relatively low temperature, one felt perfectly warm when the thermometer registered an air temperature of 52° Fahr. Some time ago, continued Mr. Barker, he had carried out some extensive laboratory investigations into the actual costs of cooking a standard meal in different kinds of cookers heated by solid fuel, gas, and electricity; and recently the comparison work had been extended to heating. For this purpose the fuel costs with gas or coal used exclusively, and with combinations of the two, had been determined; two London County Council houses being taken for the tests, which had occupied a considerable time. As a result of this work, he had found that, in the case of one person living alone, gas used exclusively was, for equal comfort, no dearer than solid fuel. An all-gas house was not the cheapest when more than one person occupied it; but at all events the experiments indicated the possibility of using gas exclusively. If the housewife's time had a commercial value, it was always economical to employ gas, or even electricity, if the latter was cheap.

Mr. L. ATKINSON (Past-President of the Institution of Electrical Engineers) agreed with Dr. Hill that there was a tendency to overheat premises. He thought that sedentary workers should eat more fats. Some years ago he had not been comfortable in a room at a temperature below 64° Fahr. He had, however, changed his diet from one containing a large amount of starches to one consisting of more fats, with the result that he now felt no sensation of cold when the room temperature was 52° Fahr.

Prof. DARLING thought that the most comfortable heating agent was the open coal fire, which also had an excellent ventilating effect. Hot water radiators, in his opinion, rendered the atmosphere uncomfortable, and "gas fires sent fumes into the room," and did not ventilate as well as the coal fire. He agreed that gas was cheaper than coal for intermittent heating. What they wanted to see, however, was the success of low-temperature carbonization, which up to the present had not been commercially sound. Low-temperature solid fuel would, he thought, eventually solve the smoke problem, though he must say that the low-temperature coke which he had tried burned rapidly, and the combustion was not easily controlled. Moreover, it was spongy, and occupied too much space.

Mr. ROGER PRESTON (Vice-President of the Institution of Heating and Ventilating Engineers) remarked that, whatever heat was necessary to give complete comfort, it was desirable to furnish what he termed a "moderate basis heat." He was strongly of opinion that the most comfortable house was one in which a moderate and uniform temperature (of, say, 45° Fahr.) was maintained by some central heating system, and where the "finishing-off" radiant heat was supplied inexpensively either by gas or by electricity. Regarding modern gas fires, well designed and properly fitted, though no test could detect any change in the atmosphere of the room in which they were placed, some people seemed to be adversely affected by them.

One gentleman present at the meeting observed that, as the result of tests he had carried out, the coal fire had proved the victor from the points of view of comfort and cost. In one room he had fitted a gas fire. This cost 18d. per day, and while the heat given out was not great, the atmosphere was disagreeable. An old register grate burning coal cost 9d. a day, and an anthracite stove 4½d. a day. In his house he had two rooms of a similar size. In one a coal stove and hot-water boiler was fixed. The running costs of this stove were 2s. 6d. a week. In the other, which was used as an office, there was an electric radiator which was used for six hours a day, and cost 4s. a week. Gas, he said, was hopelessly out of the running.

Dr. FISHENDEN, in the course of a brief reply, said she was not surprised with Mr. Barker's remarks that the skin was extremely sensitive to radiant energy, and that when the atmosphere of a room was low, while the walls were at a somewhat higher temperature, the occupant experienced a sense of comfort. She agreed that it was perhaps better to accustom themselves to cooler rooms. The figure of 64° Fahr., she would emphasize, referred to air heating alone. It was preferable to have an air temperature below 64° Fahr., and have compensating radiant heat of some form. Prof. Darling had raised the question of gas fire ventilation. A well-fitted gas fire could not possibly harm the atmosphere of a room. Perhaps monotony of effect, or some other unconsidered factor, had something to do with complaints. Certainly there was still a great deal to be learnt about heating. Dr. Fishenden said she thought that more use should be made of gas coke, which, if low in moisture and ash, burned very satisfactorily in the open grate, giving a most agreeable fire. Manufacturers should put on the market grates specially designed for burning gas coke.

Midland Association of Gas Engineers and Managers.—Members will note that the annual general meeting (at 2.30 on Thursday, March 11) will be held in the Imperial Hotel, Temple Street, Birmingham. The new President (Mr. F. C. Briggs, of Dudley) will deliver his address, and a discussion on "Meter Repairs at Gas-Works" will be opened by Mr. Harold Davies, of Chesterfield.

Antwerp Gas Exhibition.—From the Committee of the International Gas Exhibition, to be held in Antwerp in May, comes the news that H.M. the King of the Belgians has accorded his patronage thereto. The Commitee are determined that no effort shall be spared to make the exhibition worthy of this honour, and of the interest which so many personages are taking in it.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER THERM SOLD FOR THE YEAR 1925.

Compiled by Mr. F. J. BRADFIELD, the General Manager and Secretary of the Commercial Gas Company.

		Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Declared calorific value	B.Th.U.	500	560	475	470	500	500	500
Gas sold on declared calorific value	therms	189,469,170	89,801,764	19,188,128	15,465,388	16,855,863	14,857,005	31,398,595
Increase	per cent.	3·80*a*	·67	2·12	2·78	5·72	4·06	3·08
Gas made per ton coal on works tests	therms	71·67*b*	72·34	69·87	67·48	..	70·52	66·07
Gas unaccounted for	per cent.	5·03	2·65	7·23	7·21	6·08	4·84	6·43
Coke made for sale per ton of coal	cwt.	10·45	9·93	11·52	9·51	9·49	9·20	10·70
Tar made per ton of coal	gallons	9·70	9·35	9·93	10·01	9·91	10·64	10·61
Liquor made per ton of coal	gallons, 8 oz.	35·66	41·06	37·53	36·50	35·58	33·32	36·65
Percentage of coke used as fuel		17·71	18·48	14·65	17·54	24·89	21·26	14·04
Capital expended per therm sold		s. d. 1 8·26	s. d. 1 4·39	s. d. 1 7·30	s. d. 1 8·58	s. d. 2 0·23	s. d. 1 11·57	s. d. 1 8·28
Price of gas per therm		8⅜d. & 9⅜d.	8d. & 8⅝d.	8⅝d. & 9⅜d.	7⅞d. to 10⅜d.	9½d. to 12⅝d.	10d. & 9⅜d.	9⅝d. & 10⅜d.
Costs per Therm Sold. REVENUE ACCOUNTS.		d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.		4·51	4·45	5·05	5·50	5·74	4·94	5·76*e*
Less residuals—Coke and breeze		1·74	1·91	2·34	2·06	1·81	1·33	1·55
Tar		·35	·48	·42	·27	·37	·36	·40
Amm. liq. and sulph. amm.		·13	·26	·31	·18	·08	·14	·04
Total residuals		2·22	2·65	3·07	2·51	2·26	1·83	1·99
Net for coals, oil, &c.		2·29	1·80	1·98	2·99	3·48	3·11	3·77
MANUFACTURE—								
Salaries		·11	·20	·17	·22	·23	·16	·19
Wages—carbonizing		·49	·56	·58	·61	·66	·52	·60
Purification		·04	·11	·10	·15	·08	·09	·10
Repairs—plant		1·69	1·59	1·75	1·80	1·61	1·91	1·35
Net manufacture		4·62	4·26	4·58	5·77	6·06	5·79	6·01
DISTRIBUTION—								
Wages and salaries		·48	·29	·36	·41	·46	·29	·48
Repairs—Mains and services, &c.		·65	·52	·55	·63	·74	1·30	·59
,, Meters and prep. meters and fittings		·42	·85	·61	·56	·82	·53	·31
,, Stoves—ordinary and prepayment		·60	·60	·73	·77	·57	·48	·51
Total net manufacture and distribution		6·77	6·52	6·83	8·14	8·65	8·39	7·90
Public lamps—lighting and repairing		·12	·16	·10	·14	·22	·17	·13
Rents, rates, and taxes		·71	·37	·54	·25	·29	·52	·59
MANAGEMENT—								
Directors, Auditors, and salaries (Secretary, &c.)		·08	·11	·14	·13	·15	·14	·11
Collectors		·18	·20	·29	·22	·19	·20	·17
Stationery and general charges		·12	·21	·18	·21	·14	·12	·09
Profit-sharing		·09	·20	·12	·31	·19	·13	..
Bad debts		·01	·01	·01	·01	·01	·00	·00
Law and parliamentary charges		·01	·03	·00	·03	·02	·02	·02
Superannuations, Pension Funds, &c.		·15	·16	·27	·18	·26	·18	·11
National Insurance		·06	·08	·06	·07	·04	·06	·06
Sundries		·01	·01	·01	·01	..	..	·00
Total expenditure (*less* residuals)		8·31	8·06	8·55	9·70	10·16	9·93	9·18
GAS		8·67	8·21	8·97	9·02	10·65	9·73	10·15
Rentals—Meters and prep. meters and fittings		·80	·76	·79	1·11	·64	·40	·89
Stoves		·41	·34	·51	·99	·57	1·43	·40
Incand. mantle maintenance		..	..	·02	·14	..	·00	..
Miscellaneous		·03	·01	·01	·03	·01	·02	·01
Total—Gas, rentals, &c.		9·91	9·32	10·30	11·29	11·87	11·58	11·45
Balance, being profit		1·60	1·26	1·75	1·59	1·71	1·65	2·27
Dividend and interest		1·70	1·43	1·68	1·62	1·69	1·53	1·57
Surplus or Deficit		*Def.* ·10	*Def.* ·17	·07	*Def.* ·03	·02	·12	·70
Contributions to funds and sundry payments		·05*c*	·03*d*	..	..	..	·18*g*	·37*f*
SUNDRIES.		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton		28 3·59	25 7·94	28 3·77	28 9·33	..	31 1·14	33 5·00
Coke realized per ton of coal		11 11·96	10 10·20	13 11·01	10 6·42	11 2·96	10 1·57	12 2·53
Coke ,, ,, of coke		22 11·54	21 10·11	24 1·88	22 1·81	23 8·27	22 0·25	22 9·82
Breeze ,, per ton		11 10·22	3 7·72	5 3·62	6 7·23	4 4·42	5 5·78	7 3·39
Tar realized per gallon		0 3·24	0 3·56	0 3·08	0 1·92	0 2·86	0 2·97	0 3·11
Amm. liquor, &c., realized per butt, 8 oz.		2 11·27	4 3·35	5 4·52	3 3·35	1 6·57	3 9·29	0 10·79
Percentage of stoves at rental to consumers		87	111	96	98	116	84	95
Bad debts per cent. on total receipts		·08	·06	·04	·09	·04	·01	·03
Net profit per cent. on ordinary capital		4·62	5·04	5·56	6·38	6·61	7·80*h*	8·02
One-fifth penny variation equals		£157,891	£74,835	£15,990	£12,888	£14,047	£12,381	£26,165
Water gas per cent. on total make of cubic feet.		31·17	..	19·22	14·87	24·07	34·22	38·94

a—About 1 p.c. represents gas supplied in bulk to Brentford Gas Company.

b—Before benzole extraction.

c—Redemption Fund.

d—Reserve Fund.

e—Inc. ·43d. gas purchased in bulk.

f—Expenses Brentford Gas Order, 1924.

g—Renewal Fund ·16
Exs. Issue of Pref. 5½ p.ct. Stock ·02
·18

h—Including electricity results.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER 1000 C.FT. SOLD IN THE YEAR 1925.

Compiled by Mr. F. J. BRADFIELD, the General Manager and Secretary of the Commercial Gas Company.

	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Gas sold . . . . . thousands	37,893 834	16,036,029	4,039,606	3,292,508	3 371,173	2,971.401	6,279,718
Increase . . . . . per cent.	3·80*a*	·67	2·12	2·78	5·72	4·06	3·08
Gas made per ton of coal carbonized. cubic feet	13,257	12,879	13,642	14,202	12,533	14,105	12,332
Gas unaccounted for . . . . . per cent.	5·03	2·65	7·23	7·21	6·08	4·84	6·43
Coke made for sale per ton of coal . cwt.	10·45	9·93	11·52	9·51	9·49	9·20	10·70
Tar made per ton of coal. . . . . gallons.	9·70	9·35	9·93	10·01	9·91	10·64	10·61
Liquor made per ton of coal . . gallons, 8 oz.	35·66	41·06	37·53	36·50	35·58	33·32	36·65
Percentage of coke used as fuel	17·71	18·48	14·65	17·54	24·89	21·26	14·04
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Capital expended per 1000 cubic feet sold . . .	8 5·28	7 7·78	7 7·67	8 0·75	10 1·16	9 9·86	8 5·41
Price of gas charged per 1000 cubic feet . . .	3/7 and 3/11	3/8 8 and 4/1	3/5·80 and 3/8·65	3/9·66 to 4/1·82	4/1 to 5/2	4/2 and 3/11	4/1 and 4/5
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	22·53	24·90	24·00	25·86	28·71	24·69	28 80*d*
Less residuals—Coke and breeze.	8 69	10·71	11·13	9 68	9·04	6·66	7·75
Tar	1·74	2·69	2·01	1·27	1·86	1·80	2·03
Amm. liq. and sulph. amm.	·65	1·45	1·46	·87	·40	·69	·19
Total residuals . . .	11·08	14·85	14·60	11·82	11·30	9·15	9·97
Net for coals, oil, &c. .	11·45	10·05	9·40	14·04	17·41	15·54	18·83
MANUFACTURE—							
Salaries	·55	1·13	·79	1·04	1·16	·80	·93
Wages—carbonizing	2·43	3·16	2·78	2·86	3·29	2·61	3·01
Purification	·22	·63	·50	·70	·41	·47	·51
Repairs—plant	8·45	8·90	8·30	8·46	8·04	9·53	6·75
Net manufacture . .	23·10	23 87	21·77	27·10	30·31	28·95	30·03
DISTRIBUTION—							
Wages and salaries	2·43	1·61	1·72	1·94	2·28	1·45	2·41
Repairs—Mains and services, &c.	3·24	2·90	2·59	2·95	3·70	6·51	2·94
" Meters and prep. meters and fittings.	2·11	4·77	2 88	2·64	4·10	2·65	1·57
" Stoves—ordinary and prepayment .	2·99	3·35	3·49	3·64	2·87	2·40	2·54
Total net manufacture and distribution .	33·87	36·50	32·45	38·27	43·26	41·97	39·49
Public lamps—lighting and repairing	·60	·90	·48	·67	1·07	·82	·62
Rents, rates, and taxes	3·54	2·07	2·57	1·18	1·45	2·58	2·95
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary,&c.)	·39	·61	·66	·62	·77	·71	·53
Collectors	·90	1·15	1·40	1·02	·96	1·01	·86
Stationery and general charges	·61	1·18	·85	1·01	·72	·60	·46
Profit-sharing	·46	1·14	·58	1·46	·94	·65	..
Bad debts.	·05	·04	·02	·06	·03	·01	·02
Law and parliamentary charges	·04	·14	·01	·12	·07	·08	·08
Superannuations, Pension Funds, &c.	·76	·91	1·29	·84	1·31	·90	·57
National Insurance	·29	·42	·29	·34	·20	·32	·30
Sundries	·03	·05	·02	·02	..	..	·02
Total expenditure (*less* residuals) . . .	41·54	45·11	40·62	45·61	50·78	49·65	45·90
GAS.	43·33	45·97	42 59	42·41	53·26	48 63	50·73
Rentals—Meters and prep. meters and fittings.	4·01	4·24	3·77	5·23	3·18	1·99	4·47
Stoves	2·04	1·88	2·43	4·64	2·84	7·13	1·98
Incand. mantle maintenance . . .	..	..	·10	·66	..	·01	..
Miscellaneous	·15	·08	·04	·15	·06	·12	·05
Total—Gas, rentals, &c.	49·53	52·17	48·93	53·09	59·34	57·88	57·23
Balance, being profit	7·99	7·06	8·31	7·48	8·56	8·23	11·33
Dividend and interest	8·50	8 00	7 97	7·63	8·47	7·62	7·86
Surplus or deficit	*Def.* ·51	*Def.* ·94	·34	*Def.* ·15	·09	·61	3·47
Contributions to funds and sundry payments .	·22*b*	·15*c*	..	..	..	91*f*	1·85*e*
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	28 3·59	25 7·94	28 3·77	28 9·33	..	31 1·14	33 5·00
Coke realized per ton of coal	11 11·96	10 10·20	13 11·01	10 6·42	11 2·96	10 1·57	12 2·53
Coke " " of coke	22 11·54	21 10·11	24 1·88	22 1·81	23 8·27	22 0·25	22 9·82
Breeze " per ton	11 10·22	3 7·72	5 3·62	6 7·23	4 4·42	5 5·78	7 3·39
Tar realized per gallon	0 3·24	0 3·56	0 3·08	0 1·92	0 2·86	0 2·97	0 3·11
Amm. liquor, &c., realized per butt (8 oz.) . .	2 11·27	4 3·35	5 4·52	3 3·35	1 6·57	3 9·29	0 10·79
Percentage of stoves at rental to consumers . .	87	111	96	98	116	84	95
Bad debts per cent. on total receipts	·08	·06	·04	·09	·04	·01	·03
Net profit per cent. on ordinary capital	4·62	5 04	5·56	6·38	6·61	7·80 *g*	8·02
Water gas per cent. on total make of cubic feet .	31·17	..	19 22	14·87	24·07	34 22	38·94

a—About 1 p.ct. represents gas supplied in bulk to Brentford Gas Company.

b—Redemption Fund.

c—Reserve Fund.

d—Inc. 2·15d. gas purchased in bulk.

e—Expenses Brentford Gas Order, 1924.

f—Renewal Fund . . . . . d. ·81
Exs. Issue of 5½ p.ct. Pref. Stock . ·10
·91

g—Including electricity results.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

[Two short papers were read at this meeting. Mr. A. R. Filer, of Ryde, dealt with prepayment gas meters from a strictly practical point of view, mentioning, among other interesting items, that, though a consumer who has to insert two coins to obtain a supply will probably think that value is not received for the first coin inserted, this conclusion is a mistaken one. The other paper, by Mr. T. H. Prater, of Tottenham, was an abstract of a thesis on coal gas condensation which won for him the Diploma of the Institution of Gas Engineers. Among other questions which the writer asks in this highly technical contribution is whether there is any reason why the greater portion of the benzole in the tar should not be vaporized into the gas. Benzole vapour is more remunerative than the liquid, and its presence in the gas tends to a reduction in naphthalene and meter troubles. Mr. Prater's abstract is published to-day; and Mr. Filer's paper will appear in our issue for March 10.]

A well-attended meeting of the Association, devoted to the reading and discussion of two short papers, was held at the Westminster Technical Institute on Friday, Feb. 26—Mr. W. L. Westbrook, of the North Middlesex Gas Company, presiding.

COAL GAS CONDENSATION.

By T. H. Prater, of Tottenham.

Condensation is a branch of gas-works technique that seems to have developed along original lines; and it is not often that this important aspect of purification receives serious attention and investigation.

From a review of technical publications during the past twenty years, it would appear that only one type of condenser essentially different from the common air or water cooled type has been suggested, and that no treatment of the condensed tar by the already cooled gas stream has been mentioned. With the considerable advances in design and efficiency of carbonizing plant and appurtenances, it seems strange that the condensing plant should be materially the same, and worked in almost the same manner, as in the early days of gas production.

It was therefore thought that an investigation to ascertain whether quick or slow condensation is the ideal to be aimed at would be of interest, for, according to available evidence, this has not been finally decided. Some authorities state that shock condensation deprives the gas of valuable light vapours; others maintain that it has no prejudicial effect. Some refer to cold tar as the greater absorbent of these vapours; others suggest that hot tar is best. Consequently it was thought that the investigation might result in some conclusion regarding these contradictory statements.

Unfortunately, in technical gas analysis, there is no satisfactory method of estimating separately the various constituents that go to form the C_nH_m content of coal gas. On the results published by Dr. Lessing, however, it would appear that the vapours of benzene, toluene, and xylene together constitute about one-quarter of the unsaturated hydrocarbons.

It is admittedly more desirable at the present time to carry in the gas as much hydrocarbon vapour as possible, not only because the vapour is more remunerative than the liquid, but also because its presence in the gas tends to a reduction in naphthalene and meter troubles. The writer would therefore ask if there is any reason why the greater portion of the benzole in the tar should not be vaporized into the gas. This could be easily effected, as the gas is by no means saturated with benzole vapour, even with the most careful condensing.

From the vapour pressures, it is demonstrated that coal gas saturated with benzole at 15° C. would contain about 8·0 p.ct. by volume of benzole vapour, while if saturated with prebenzole, toluole, and solvent naphtha as well, it would carry over 30 p.ct. by volume.

Some means by which to effect the absorption, by the gas, of benzole present in the tar, was required; and it was thought that washing the gas with heated tar after complete condensation would accomplish this. An attempt to arrive at a conclusion regarding the temperatures necessary and the possible results of such treatment could not be successful if based on the theory of partial pressures, as so many factors prevent a true or even approximate molecular weight of the tar being obtained. Recourse had therefore to be made to experiment.

To determine the temperatures at which the rejection of C_nH_m by the tar, and their absorption by the gas, began, an apparatus in which a divided gas stream could be passed at a definite rate through four similar volumes of the same tar was constructed. Provision was made for heating each of the four washing bottles to a different temperature—viz., 20°, 40°, 60°, and 80° C.—and at the same time for collecting average samples of the gas supplied and the gas washed.

In carrying out these tests, the coal tar to gas ratio was kept high, to ensure the difference in the readings of the C_nH_m content in the washed gas varying to a greater extent than might be caused by experimental error in the subsequent gas analysis. The rate of gas passage was slow (0·02 c.ft. per hour), to allow equilibrium to be more easily attained. The tar to gas ratio was actually more than one thousand times that obtained with a yield of ten gallons of tar per ton with 13,000 c.ft. of gas. However, it is correct to say that a transference of vapour from the tar to the gas, if taking place in these experiments, would also take place in practice; but the increase of the C_nH_m content of the gas would, of course, not occur to the same extent.

The results of these tests are set out in Table I.

Table I.

Origin of Tar Used.	Temperature of Washing.	Analysis of Washed Gas.			Analysis of Gas before Washing.		
		CO_2.	O_2.	C_nH_m.	CO_2.	O_2.	C_nH_m.
1. Hydraulic main	20	3·8	1·4	3·0	3·9	1·8	3·0
	40	4·0	1·3	3·0			
	60	4·2	1·3	3·2			
	80	4·8	1·2	4·0			
2. Cyclone	20	3·9	1·2	2·9	3·9	1·2	3·3
	40	3·7	1·2	3·0			
	60	3·7	1·2	3·2			
	80	3·4	1·3	3·8			
3. First atmospheric condensers	20	3·6	1·1	3·1	3·8	1·6	3·6
	40	3·8	1·1	3·1			
	60	3·7	1·4	3·4			
	80	3·3	1·6	3·9			
4. Second atmospheric condensers	20	3·2	1·1	2·9	3·7	1·5	3·3
	40	4·0	1·2	3·4			
	60	6·8	1·3	3·9			
	80	8·1	1·3	4·5			
5. 'P. & A." extractor	20	3·4	1·4	3·2	3·8	1·7	3·8
	40	4·6	1·6	3·9			
	60	11·0	1·9	4·6			
	80	11·2	1·9	5·4			
6. Same as No. 5, dehyd. and de-oiled up to 100° C.	20	3·3	1·2	2·8	3·9	1·2	3·6
	40	3·3	1·2	3·3			
	60	3·6	1·3	3·8			
	80	3·7	1·6	4·3			
7. Same as No. 5, dehyd. and de-oiled up to 170° C.	20	4·0	1·2	3·0	4·0	1·2	3·7
	40	4·0	1·2	3·0			
	60	4·0	1·2	3·2			
	80	4·0	1·2	3·2			

The variation of the CO_2, and probably the oxygen, content was due to varying amounts of ammoniacal liquor, as is shown in the case of tar No. 5, which gave in the first test, with untreated tar containing 5·8 p.ct. of water, an increase in the CO_2 figure of more than three times. When this tar was dehydrated at 100° C., the CO_2 showed a decrease, such as is found in tests Nos. 2 and 3; while with complete dehydrating and de-oiling up to 170° C., there was neither increase nor decrease.

The samples of tar used in these tests were analyzed; and the results are set out in Table II.

Table II.

Number	1.	2.	3.	4.	5.
Origin of Tar	Hydraulic Main.	Cyclone Extract.	First Atmospheric Condenser.	Second Atmospheric Condenser.	"P. & A." Extractor.
Sp. gr. at 60° Fahr.	1·201	1·168	1·124	1·086	1·086
Water by volume, p.ct.	4·4	17·4	2·0	4·0	5 8
True oil to 170° C.—(vol. dry basis)	*Nil*	1·0	1·8	5·0	7·2
Oil 170° to 230° C.—(vol. dry basis)	8·0	8·2	35·3	52·1	45 8
Oil 230° to 270° C.—(vol. dry basis)	10·0	10·7	15·1	16·7	11·0
Oil 270° to 300° C.—(vol. dry basis)	2·9	24·4	4·2	2·9	3·4
Oil 300° to 330° C.—(vol. dry basis)	4·2	*Nil*	4·5	2·9	3·4
Naphthalene, p.ct. by wt.	8·9	11·0	32·4	32·1	40·0
Sp. ht. of dry tar	0·401	0·486	0·526	0·528	0·535

These samples were obtained from the points mentioned in Table II. when the plant was treating the gas from horizontal through retorts worked at 1100° C. and having dip pipes sealed ¾ in., with a pull of 9-tenths. Examination of these figures confirms the generally accepted idea that with normal slow condensation the light oil is thrown down in successively increasing proportions, and that the naphthalene content of the tar increases as the time allowed for the attainment of equilibrium. In the case under notice, the condensation took 70 seconds, and the rate of travel was 8 ft. per second.

It is interesting to notice, in passing, that while using shock condensation, a "P. & A." tar extractor, working at 7 in. differential, and treating the gas after condensation, was extracting a liquid with 90 to 95 p.ct. of water. This was observed on several occasions. The liquid extracted easily separated on standing, giving a tar with about 5 p.ct. of water, similar in

composition to the test shown in Table II. for the same machine with normal working.

It is stated, by those who do not approve of this method of condensing, that shock condensation brings down the benzole; and tests are advanced to prove this. Such tests as have so far been published are generally open to criticism—*e.g.*, in one case the tests were carried out at two different works, and the results then compared.

In view of the fact that authorities such as Dr. Carpenter and Dr. Davidson have stated that, with shock condensation, the loss in quality of the gas is insignificant, and as there do not seem to be any figures to support satisfactorily the assertion of prejudicial effect on the gas by such treatment, the following tests were carried out on horizontal water-tube condensers.

TABLE III.

Test number	1.	2.	3.	4.	5.	6.	7.
Type of condenser	W.C.	A.C.	W.C.	A.C.	A.C.	W.C.	A.C.
Time of passage of gas, secs.	33	151	14	54	57	10	41
Range of cooling, ° Fahr.	158–70	156–68	157–103	158–105	158–105	168–134	168–134
Sp. gr. of tar at 60° Fahr.	1·035	1·085	1·088	1·128	1·128	1·123	1·127
Water, p.ct. by vol.	33·6	6·4	26·8	4·0	4·4	19·6	8·6
Apparent light oil to 170° C. (by vol.)	7·2	5·6	6·6	3·2	3·6	6·2	2·2
True oil to 170° C. (wet basis)	3·2	4·3	2·3	2·6	2·9	1·4	1·5
True oil to 170° C. (dry basis)	4·8	4·6	3·1	2·7	3·0	1·7	1·6
Oil, 170° to 230° C. (by vol., dry basis)	8·4	21·2	20·0	16·8	18·6	19·4	18·8
Oil, 230° to 270° C. (by vol., dry basis)	4·4	5·2	6·4	9·2	11·2	12·8	11·2
Oil, 270° to 300° C. (by vol., dry basis)	2·4	3·6	4·4	6·0	4·8	5·2	5·6
Oil, 300° to 330° C. (by vol., dry basis)	..	4·8	5·2	7·6	8·4	17·2	8·0

It will be observed that tests 1 and 3 both show the highest apparent light oil content. They also show the highest water content; and the writer thinks that the true light oil figures (wet basis) will demonstrate the need for always adopting a standard method of testing, and mentioning when it is used. The true light oil figure was arrived at by dehydrating the tar up to 170° C., and then carefully separating the distillates and returning the oil to the flask, after which the distillation was continued in the normal manner. Such a precaution makes all the difference to the true oil figure on the dry basis, as is shown in the table just mentioned.

With shock condensation, the tar formed invariably seems to have a large water content; and it is suggested that as the distillation of this water during the test increases the apparent light oil content, this might be the reason for the popular impression that shock condensation is bad.

A further examination of the tests will show that, comparing No. 3 with Nos. 4 and 5, and No. 1 with No. 2, in which the cooling was done by water-cooled and atmospheric condensers respectively, the true dry basis light oil content is practically the same. Any increase that there may be in the light oil figure of the condensate from the water-cooled condenser, the writer would attribute to " washing " of the gas by the condensate dripping off the horizontal tubes. With vertical tubes one would expect no increase.

The fact that shock condensation is generally associated with a high water content tar, may have another bearing on the matter, as it is questionable whether the tar ever really comes into intimate contact with the gas, because each drop of tar seems to be enclosed in an envelope of water.

Some time ago, during an investigation of tar emulsions, the writer had occasion to determine which was the outer phase; and the results proved that water was the continuous phase. This result is in agreement with the observations on the liquid coming away from the " P. & A." machine, referred to previously. The action of shock condensation evidently forms a large amount of fog, in which the water, being the outer phase, predominates. This fog is carried along with the gas until an extractor is reached.

Sudden condensation such as practised at coke ovens has also been affirmed to bring down the naphthalene; but it is not stated whether this assumption is based on the naphthalene content of the gas stream or of the tar produced. Referring again to Table II., there will be found the naphthalene content of the tar, ascertained by the Coleman and Smith method.

To ascertain the effect of the rate of condensation on the amount of naphthalene left in the gas, a large number of parallel tests were made; and these are set out in Table IV.

The results are so amazing in their variety that no satisfactory conclusions can be drawn. From the figures, one can only generalize that in the second case the lower naphthalene on the inlet is due to more prolonged contact with the heavy tar on the sides of the foul main cyclone and main condensers; and that the smaller decrease between inlet and outlet is due to very slow cooling.

TABLE IV.—*Effect of Condensation Rate on Naphthalene in Gas.*

Time of passage of gas (secs.)	70		132	
Rate of passage of gas	8·05 ft. per sec.		4·25 ft. per sec.	
Cooling range, ° Fahr	150–70.		150–70.	
$C_{10}H_8$ Grains per 100 C.Ft.	Inlet.	Outlet.	Inlet.	Outlet.
Maximum	185·4	73·0	196·4	90·7
Minimum	78·2	34·9	34·6	25·4
Average	131·2	50·5	101·6	70·0

Turning again to Table II., it will be observed that, though a distillation test shows no light oil present in the tar from the hydraulic main, yet a small amount must be present to account for the increase of C_nH_m in the gas when washed at 80° C. If this test is compared with No. 7, it will be seen that if no light oil is present, as in this case, there is even at 80° C. a marked absorption of C_nH_m.

It is generally considered bad to allow the dip pipes of the hydraulic main to be sealed in tar, while the possibility of C_nH_m being absorbed by the gas from the tar in such a case is considered by Newbigging to be " altogether untenable; " but the writer would suggest that tar fog is present right up to, and in, the ascension pipe, and that this fog has already come into partial equilibrium with the light vapours. As some of this fog is immediately removed from the gas in the hydraulic main, this accounts for the results obtained in the absorption tests, and explains why the gas washed in hydraulic main tar shows an increase in C_nH_m.

There seems to be no question of its being desirable either to remove the tar from the gas as soon as it is deposited, or to run the tar counter-current to the gas, to prevent undue absorption. It is feasible that, compared with present methods, the adoption of the counter-current principle might partially enrich the gas by reducing the drop in C_nH_m in the gas between the hydraulic main and the wet purification plant.

There can be little doubt that some method of hot tar washing, apart from transferring some of the benzole in the tar to the gas, and so giving an extra 0·1 or 0·2 therm, would also enable the tar to be sold on 1 p.ct. water basis, or even less, as the tar would be separated hot, and partially dehydrated.

The disadvantages of any system of hot tar washing are also made apparent by the tests, and they appear to be:

(*a*) That where the tar has been in contact with the gas for considerable time, it has absorbed a substantial amount of CO_2 and O_2, which are given back to the gas when the tar is heated.

(*b*) That the tar from the hydraulic main has a marked affinity for absorbing O_2 from the gas—an affinity that increases as the temperature. This is bad for the tar, seeing that about half the total tar made is formed in the hydraulic main. This action would lead to the formation of unwanted tar acids from the phenols.

The question of the absorption of the naphthalene by the gas stream when bubbled through tar at 80° C. was investigated; and it was found, as a result of passing 11¼ c.ft. of gas through 40 c.c. of tar at 80° C., containing 15·1 p.ct. by weight of naphthalene, that the gas absorbed about 77 p.ct., or 81 grains, of naphthalene. This test was carried out with the correct tar to gas ratio—*i.e.*, 10 gallons of tar to 13,000 c.ft. of gas—and resulted in a transference to the gas of 13 lbs. of naphthalene per ton of coal. At 60° C. the quality of the salt deposited during the subsequent cooling was good, but at 80° C. the salt was rather oily, due probably to entrained light oil resulting from the rather crude bubbling device.

Resulting from the tests outlined above, the writer would suggest the desirability of condensing and subsequently treating the gas as follows:

(*a*) Foul main dip pipes sealed in liquor.
(*b*) Cyclone followed by a static separator such as Prof. Burstall's.
(*c*) Exhausters.
(*d*) " P. & A." extractor followed by water-cooled vertical tube condensers.
(*e*) Gas preheater followed by hot tar washer.
(*f*) Water-cooled vertical tube condensers with scrapers.

The reasons for the various apparatus are:

Pitchy deposits, together with ammonium chloride, can only be prevented from causing trouble in the foul main by flushing with liquor.

Cyclone and static extractors partially to remove tar fog.

If the exhausters are of the fan type they will act as tar fog extractors; if of the ordinary rotary type, they will not need lubrication.

The " P. & A." machine will remove the remaining tar fog, and is placed after the exhauster, to enable it to be worked at a high differential, and consequently with greater efficiency.

Some of the water from the vertical water tube condensers would be used in the gas preheater which follows.

The hot tar washer could be of the Livesey type, but with only a space of about 6 in. below the bubbling grids. It would

be fitted with baffle plates, to ensure freedom from short circuiting; also with a steam coil, to supply auxiliary heating.

The condensers would be fitted with scrapers such as are found on boiler economizer tubes. These condensers would have to be in duplicate, so that gas could be directed through one while the passages in the other were obstructed by the scrapers in action.

The gas preheater and the plant following would not be more than a tenth the size of the main plant, for a reason to be explained later.

When the scheme is examined from the heat-balance point of view, the following is noted:

That, if from 1 ton of coal 13,000 c.ft. of gas are evolved, and from the foul main, tar extractors, and condensers treating this volume of gas, 10 gallons of tar and 15 gallons of liquor are obtained, then these condensates contain 13,125 B.Th.U. above 60° Fahr. This is assuming the condensates to be at 110° Fahr., with a specific gravity of 1·05 and a specific heat of 0·9, which experiment has shown to be an average specific heat.

Practice has also demonstrated that about 25 gallons of water per 1000 c.ft. of gas is an average requirement for cooling the gas from 150° to 70° Fahr. in a water-tube condenser, the water originally being at 50° Fahr. Therefore, about 325 gallons of water is required for cooling 13,000 c.ft. of gas, which is the volume upon which all these calculations are based; and this amount of water, if heated to 120° Fahr., would represent a heat source of 195,000 B.Th.U.

For the reheating of the whole gas stream, the following calculations were made:

The weight of 100 c.ft. of gas at a specific gravity of 0·558 is 4·3 lbs., so that, with a specific heat of the gas of 0·46 (see Table V.), the heat required to raise that volume of gas 1° Fahr. is the same as the heat required to raise 2·0 lbs. of water 1° Fahr.—*i.e.*, 2·0 B.Th.U.

Table V.—*Specific Heat of Coal Gas.*

Gas.	Sp. Ht. of Equal Wts.	Sp. Ht. of 100 C.Ft.	Av. Coal Gas, P.Ct. by Vol.	Sp. Ht. of 100 C.Ft.
CO_2	0·22	2·5	3·0	0·075
O_2	0·22	1·8	1·0	0·018
C_nH_m	0·40	2·9	3·0	0·087
CO	0·24	1·8	8 0	0·144
H_2	3 41	1·8	48·0	0·864
CH_4	0·59	2·5	25·0	0·625
N_2	0·24	1·8	12·0	0·216
				2·029

By experiment, it has been found that by passing gas at 176° Fahr. through tar containing just over 5 p.ct. of water it is possible to obtain a residual tar containing under 0·2 p.ct. of water. At the same time the specific gravity of the tar increased from 1·158 to 1·171 at 60° Fahr. Therefore the feasibility of effecting this on the practical scale will now be reviewed.

If the 10 gallons of tar obtained per ton contain as a maximum (say) 10 p.ct. of water, this would represent 1 gallon—say, 10 lbs. Then 10 lbs. of water evaporated at normal pressure and 212° Fahr. = 266 c.ft. of vapour. At 176° Fahr. the volume x, varying directly as the absolute temperature, will be $266 : x :: 373 : 353$, whence $x = 252$ (approximately). 13,000 c.ft. at N.T.P. will at 176° Fahr. be represented by $13{,}000 : x :: 289 : 353$, whence $x = 15{,}880$ (approximately). Therefore the total volume at 176° Fahr. would be 15,880 + 252 = 16,132, of which the water vapour would represent 1·6 p.ct. by volume. Hence, if the gas from 1 ton of coal absorbed the whole of the water in the tar which had condensed from that volume of gas, then the saturation of the gas would only be raised 1·6 p.ct. Raising 13,000 c.ft. of gas to 120° Fahr., which is about the limit with the water leaving the primary condensers, will require 30 gallons of this water calculated as follows: 13,000 c.ft. at 4·3 lbs. per 100 = 559 lbs. Sp. ht. of gas is 0·46, therefore 559 lbs. = 257 lbs. of water. This has to be raised 60° Fahr., and will require 257 × 60 = 15,420 B.Th.U. to accomplish it. This amount of heat could easily be provided by the use of 30 gallons of primary condenser water at 120° Fahr. Remembering that the gas originally required 325 gallons to cool it, it will be seen that there is ample left for boiler feed after the amount required for this process has been used.

The further heating of this volume of gas to the required temperature would require a considerable amount of heat from an external source. It does not, however, from experiment, seem necessary to pass all the gas through the suggested apparatus, for, even if only 1000 c.ft. for each 13,000 c.ft. of gas made was treated as suggested, the percentage of benzole vapour in the gas treated would not increase more than 0·5 to 0·6 p.ct., while the water in the tar could still be easily carried by the gas. At the same time a great saving in heat would be effected.

If this 1000 c.ft. absorbed all the water from the 10 gallons of tar, then it would contain 252 c.ft. of water vapour; or, expressed as a percentage, 1000 c.ft. at N.T.P. become at 176° Fahr. 1221 c.ft. 1221 + 252 = 1473, of which the water vapour = 17·1 p.ct. by volume.

According to the vapour pressure values of Regnault, a gas saturated with water vapour at 176° Fahr. would contain 45 p.ct. by volume of water vapour, so that in the case under examination, assuming the gas when saturated at 60° Fahr. to have 2 p.ct. by volume of water vapour at 176° Fahr., the percentage will be 17 + 2 = 19 p.ct., which equals 42 p.ct. of total saturation. This supports the contention made above that the 1000 c.ft. of gas could easily carry the water vapour.

Heating 1000 c.ft. to 120° Fahr. could easily be effected by 3 gallons of primary condenser water, as only 1200 B.Th.U. are needed, while further to raise it to 180° Fahr. would call for another 1200 B.Th.U.

The temperature of the total volume of tar extracted will be about 100° Fahr. when bulked; and this needs to be raised to (say) 180° Fahr. 10 gallons of tar sp. gr. of 1·15 = 115 lbs., the specific heat being 0·5 (see Table II.). Therefore 57½ B.Th.U. will raise it 1° Fahr., and to raise it 80° Fahr. requires 4600, while to convert the 10 lbs. of water into vapour will take another 10,000, making a total for the tar of 14,600 B.Th.U. Since 1200 are required for the gas, the total heat needed from an external source is 1200 + 14,600 = 15,800 B.Th.U.

As such a plant as suggested would probably be installed in the proximity of the scrubber house, the waste heat in the steam from the scrubber engines could be utilized.

In a certain case the engine of a scrubber capable of dealing with 130,000 c.ft. of gas per hour had a bore and stroke of 8 by 8, and cut off at three-quarter stroke when making 60 r.p.m. The steam used per hour would be $8^2 \times 0{\cdot}7854 \times 120 \times 60 \div 1728 = 1256$ c.ft. The steam was at a pressure of 85 lbs. per sq.in. gauge; and as steam at this pressure is about 5 c.ft. to the lb., the total weight used per hour is 251 lbs. An engine such as the one in question is rated at 5 H.P., which agrees, on a consumption of 50 lbs. per H.P. hour, with the above figures.

The steam available per ton of coal is one-tenth of 251 lbs. per hour, which is 25 lbs., with an available total heat above 120° Fahr. of 1058 B.Th.U. per lb., which gives 26,500 B.Th.U. available per ton of coal.

For the process in view it has been decided that 15,800 B.Th.U. are needed from an external source; and it is seen that in the scrubber engine exhaust there is nearly twice this amount of heat available. Of course, a small portion of this excess would be needed to convert some of the liquid hydrocarbons into vapour.

In the subsequent cooling of the gas there will be approximately 13,000 B.Th.U. of heat to be taken out of the gas, and this will require (say) 14 gallons of water, allowing a heat transference of 80 p.ct.

The machinery required for carrying out this process would be one pump for circulating 10 gallons of tar per ton, and either hand or motor operated gear for scraping the tubes free from the naphthalene deposited.

By this investigation the following points have been demonstrated:

(*a*) That all tars condensed from the gas at a higher gas temperature than 95° to 100° Fahr. show a strong tendency to absorb unsaturated hydrocarbons from the gas if allowed to come in contact below about 60° C.

(*b*) That for the tars deposited from the gas when cooling below 95° to 100° Fahr., this critical temperature is about 40° C.

(*c*) That it is possible beneficially to affect the gas by bubbling it through the tar from the hydraulic main, providing the temperature is kept above 60° C.

(*d*) That the bad effect of shock condensation on the gas has been exaggerated, and, if existing, is very slight indeed.

(*e*) That it is possible to dehydrate the tar almost completely by the treatment outlined, at the same time increasing the yield of ammonia per ton recovered as liquor, and also the quantity of C_nH_m in the gas.

(*f*) That if the gas is subsequently washed for naphthalene with a benzolized wash oil, an increase in the saleable salt would result from the adoption of hot tar washing.

Discussion.

The Chairman, remarking upon the interest of the paper, said that when the question of publishing theses submitted for the Diploma arose, the Institution decided that they would be excellent matter for discussion at meetings of Junior Gas Associations. Doubtless those on the engineering side of the industry would greatly appreciate the paper.

Mr. Newton Booth (Woolwich Arsenal) said that Mr. Prater had put before them a most careful study of certain aspects of condensation, and of possible variation of existing processes. Apparently the author suggested shock condensation followed by reheating of the gas and re-treatment of the tar—with the object of undoing some of the effects of condensation—with subsequent cooling of the gas before it was washed. Would it not be possible, said Mr. Booth, to achieve the same end by employing ordinary methods of condensation, and treating the tar in a separate plant? The hydrocarbon vapours from the tar could then be added to the gas as desired. He could not see the necessity of having duplicate condensers. Scrapers in economizer tubes did not entail duplication; and he saw no reason why condensers should be duplicated because scrapers were fitted. Their

thanks were due to Mr. Prater for a very clear statement of the mechanism of coal gas condensation. The paper was of a high order, and showed that the author had a comprehension of the subject which was not so common as one would like.

Mr. PRATER, regarding the point raised about the duplication of the condensers, said it had to be borne in mind that naphthalene in the solid state occupied a large volume. A quantity of 1 lb. occupied 1¼ c.ft.

Mr. W. T. KENSHOLE (Lea Bridge) observed that the condensation requirements of gas from vertical retorts were different from those of gas from horizontals—a fact not always appreciated. In most vertical installations liquor was driven into the foul mains and underneath the governors, to prevent deposition of ammoniacal chloride. The gas was at a comparatively high temperature, and was capable of holding a large amount of water vapour; and the condensing of this gas was difficult compared with that from horizontals. The effect of condensation on the liquor had also to be considered. Bailey had proved that prolonged contact of liquor with tar left the former with an undesirably large content of tar acids, which made the disposal of effluent from the ammonia plant a matter of great difficulty.

Mr. PRATER said that if a gas saturated at 190° Fahr. was cooled to 100° Fahr., approximately 93,000 B.Th.U. had to be transferred from every 1000 c.ft. If the initial temperature was 180° Fahr., this quantity was reduced to 54,000 B.Th.U.—a reduction of about 40 p.ct. A further drop of 10 degrees in the initial temperature resulted in a reduction of more than 60 p.ct. He had referred in his paper to the effect of bubbling gas through tar. This increased the tar-acid content of the liquor. He thought that fractional condensation would be practised more in the future than it was at present.

Mr. LEONARD LACEY (Gas Light and Coke Company) asked what the author meant by the expression "liquid phase."

Mr. PRATER replied that this was the term usually given to the envelope of water which surrounded the globule of tar. When these envelopes were in contact, the term used to express this state was "continuous liquid phase."

Mr. A. BROADBENT (Gas Light and Coke Company) proposed, and Mr. W. R. MOGER seconded, a vote of thanks to the authors of the papers.

Mr. PRATER, in reply, said he would be glad to help any members who contemplated taking the Diploma.

BRITISH INDUSTRIES FAIR, BIRMINGHAM.

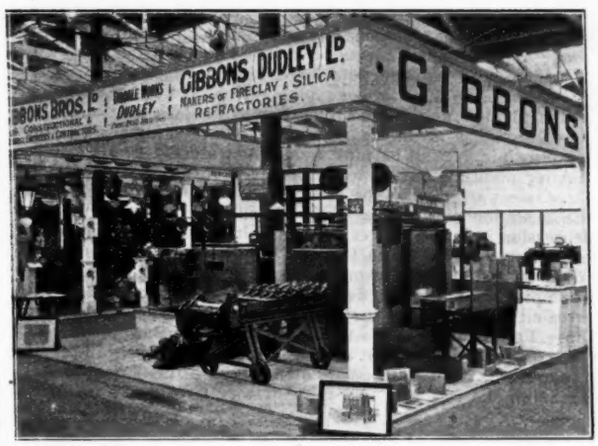
Further Photographs.

The particulars and photographs which have appeared in the two immediately preceding numbers of the "JOURNAL" have indicated the part taken by gas in this year's British Industries Fair at Castle Bromwich, Birmingham; and the story may be completed by the reproduction of further views of the stands.

The Cannon Iron Foundries, Ltd,, of Deepfields, near Bilston—a firm who are in 1926 celebrating their centenary—displayed, in addition to a large selection of their cookers, the

"Corna" gas wash boiler and "Equator" gas heated steam radiators. Prominence was given to the various styles of the firm's new inclined gas fires. These fires, as has already been pointed out, are constructed on the new inclined principle with sloping radiants, thus directing the heat towards a person's body and face, in addition to the feet. The burner consists of two parts only, and is not fitted with steatite or other fragile material. The injector is most simple, having only three parts, but is exceedingly efficient; and there is said to be no "hiss" or "whistle" when adjusted, whatever the quality or pressure of gas may be. Silence in burning and small consumption of gas are special features. There is no smell, all requirements of hygiene being claimed to be perfectly met. Another speciality was the firm's "Belle" radiator, without flue, and fitted with an argand burner, glass chimney, and copper reflector.

In the photograph of the stand of Messrs. Gibbons Bros., Ltd., and Messrs. Gibbons (Dudley), Ltd., of Dudley, are to be seen the gas furnaces, and the Gibbons-Van Marle patent machine for charging and discharging them, to which reference



has been made in previous notices of the Fair. The firm made a comprehensive display of their refractory materials—bricks, blocks, fire-backs, &c.

During his visit to the Fair, H.R.H. the Prince of Wales spent some minutes examining the exhibits on the gas fired furnace stand of the Incandescent Heat Company, Ltd. He was interested in a demonstration of bar-end heating in the firm's new high temperature "1600 C." furnace (referred to in our previous notices of the Fair), and put many questions to the representatives regarding the fuel used, the special merits of the furnace, and the industries in which it is employed.

Reports are to the effect that this was by far the most successful fair which has been held in the Midlands. Unquestionably the amount of business done was infinitely greater than ever before. Applications for space for next year show a substantial advance on previous experience. It has been decided to add at least one more huge building to the present exhibition halls; and it is possible that a second will be erected. The official estimate, on a conservative basis, is that the ultimate business resulting from the Fair at Birmingham will total £7,500,000. Orders actually placed exceeded £2,000,000. The aggregate attendance was nearly 80,000, and the trading visitors about 55,000.

THE SMOKE PROBLEM.

An address on "The City Smoke Problem and the Press" was delivered on Tuesday, Feb. 16, in the Hall of the Institute of Journalists, Tudor Street, E.C., to the members of the Scientific and Technical Circle, by Dr. John S. Owens, B.A., Assoc.M.Inst.C.E., F.R.S.I., F.G.S., F.R.G.S., who is Chairman of the Circle. The two main causes of the present smoke problem are, he said, the gradual collecting together of people into cities and the geological fact that our coal deposits are mainly of the bituminous or smoky variety. As it is impossible to alter either of these two conditions, we must look elsewhere for the remedy.

Almost from its first discovery, "sea coal"—as it used to be termed, because it was found projecting from the sea-worn cuffs—caused trouble to its users owing to the smoke emitted. The first genuine record of the use of coal in England is a receipt given by the Abbé of Peterborough in 852 A.D. for 12 cartloads of coal. The smoke nuisance was in full blast in 1257, as in the "Annals of Dunstable" it is recorded that Eleanor, Queen of Henry III., had to leave the town of Nottingham in that year owing to the smoke from sea coals. In London in 1273 sea coal was prohibited from being used, as being prejudicial to human health; but later on it again came into employment, so that towards the end of the reign of Edward I. its use had extended considerably. An agitation was got up about this time by the nobles, prelates, and others who had to visit London to attend Parliament, and who were greatly disturbed by the increased smoke. In consequence, a Royal Proclamation was issued in 1306 prohibiting artificers using coal in their furnaces. However, we have had the smoke with us until now, and are likely still to have it, unless the eyes of the people are opened to the abominable condition of the atmosphere they are forced to live in and breathe. This is one of the cases very familiar to all of us, where custom and usage tend to blind one to the real state of affairs; and it becomes necessary to try to make people realize the evil state brought about by their neglect to keep the air reasonably clean.

The normal method of solving all problems involves two distinct stages. There must first be a realization that there is a problem, and a desire to find a solution. In the absence of such a desire, the solution is rarely found; nor, indeed, is it always recognized when found. This is very important, as it leads up to the part which the Press can play in helping forward any improvement in general conditions. The second stage of the solution is the technical one: How is it to be done? In the present case, this may well be left to engineers and fuel experts. We hear much nowadays about the need for pure food; and it is essential to have it. The need for pure water has long been realized, and steps have been taken to prevent the pollution of our water supplies. Now, a human being consumes about four times as much air as he does food and water together, so it is hardly necessary to stress further the need for pure air as well as pure food and water.

After pointing out some of the evils resulting from smoke, Dr. Owens referred to the economic aspect. He remarked that the need for national economy during the present period of depression in industry is evident; and it seems useful under such conditions to give some thought to the economic cost to the country arising directly or indirectly from smoke. Elaborate attempts have been made to estimate this cost for at least three cities—London, Pittsburgh, and Manchester—and he took these figures into consideration in obtaining an estimate of the cost to this country. It is evident that each individual city must be dealt with on its own merits or demerits; and, so far as smoke is concerned, the Advisory Committee on Atmospheric Pollution now have data for the deposit of impurity from the air for forty or fifty stations in the United Kingdom. The amount of this deposit is a measure, more or less accurate, of the amount of smoke in any particular city; and upon this Dr. Owens has based a method of obtaining the cost which at least gives some approximation to its true extent.

If the soot fall S in any particular city is measured and expressed in tons per square mile, then the cost per head of the population per annum will be: $S \div 11{\cdot}9$ shillings.

This comes out at 24s. per head per annum in London, 30s. in Manchester, and 87s. in Pittsburgh. We have, therefore, for a city like London, an estimated cost of over £7,000,000 per annum which might be saved if smoke were done away with. When all the cities in the country are considered, the total loss is colossal.

In conclusion, Dr. Owens again stressed the need for educating the public out of their present condition of apathy with regard to the state of the atmosphere; the first essential to obtain a solution of the problem is the production of a strong public desire for a remedy. This takes precedence of the purely technical part, as it is the driving force which initiates effort.

A number of visitors who are keenly interested in the subject were present at the meeting, and some of them joined in the animated discussion which followed the delivery of the address. Prof. Leonard Hill, M.B., F.R.S. (Director of the Department of Applied Physiology at the National Institute of Medical Research), spoke of the health-giving effects of fresh air and sunshine, and of the great amount of work done by Dr. Owens—among other ways as Hon. Secretary to the Advisory Committee on Atmospheric Pollution. Dr. H. A. des Vœux (who has also devoted much time to the good cause of smoke abatement) declared that the only people in the world who are trying to use coal properly at the present time are the gas undertakings. He suggested that there should be a provision in the forthcoming Electricity Bill prohibiting the emission of smoke from electricity generating plants. Major P. H. Richardson (now actively interested in the manufacture and sale of "Glow-Worm" coke boilers) also drew attention, in convincing terms, to the valuable service, in connection with the matter under discussion, that is being performed by the gas industry. Adverting to the remarks of Dr. des Vœux, he expressed the opinion that electricity stations should be compelled to use the coke which had previously had all the useful bye-products extracted from it. Mr. E. W. L. Nicol (London Coke Committee) pointed out that, by means of the "Sandwich" system, large quantities of coke are at the present time being used in electricity generating stations.

A New Coke Fire.

In the course of his remarks, Mr. Nicol said he had lately had the pleasure of investigating a coke fire grate which Dr. Owens had invented, and which, so far as he knew, was on entirely novel lines. It was scientifically designed, and accomplished what it set out to do. It furnished radiant heat at less cost than that from coal. In operation it seemed in every way desirable; for it did not allow dust to percolate into the room.

Referring to this stove, Dr. Owens said he felt that in coke they had a valuable fuel for domestic fires which the public did not appear to take to; and so he had, with a certain amount of success, set to work to try to provide some new means of burning it in domestic fires.

With others, Mr. Leon Gaster (the Hon. Secretary of the Circle) expressed thanks to the Chairman for his address.

"Menno" Compressed Air Greasecup.

The object of the "Menno" greasecup is to afford automatic lubrication. There are two main parts of it—a cup which contains the grease, and a top which, with a movable disc, forms an air chamber. When the top is screwed down, the grease forms a seal around the disc, and the air, being compressed in the chamber, compels a feed of grease through the nozzle of the cup to the bearing. "Menno" cups (manufactured by the "Menno" Compressed Air Grease Cup Company, Ltd., Tollington Park, N. 4) are made in six sizes, pressed from steel or brass, for ordinary industrial purposes. They are unbreakable, and another important feature in their design is a spring lock which secures the top of the cup, and prevents vibration loosening it. They are also made in dust-proof type, where an outer cylinder pressed into the top of the cup completely envelopes the body. "Menno" greasecups are being more and more used in gas-works, for conveyors, elevators, &c. The important part about them is that automatic feed is maintained over long periods without attention.

Annual Conference of Gas Salesmen.—It has been decided to hold this year's Annual Conference of Gas Salesmen in Birmingham, during the period of the Smoke Abatement Exhibition which is to be held in that city from the 6th to the 18th of September next, in the Bingley Hall.

Water Softening for Scrubbers

Difficulties due to very hard water in the scrubbers of the Indiana Coke and Gas Company, Terre Haute, were so acute that a remedy had to be sought. Describing the experience in the "Gas Age-Record," Mr. Philip J. Wilson, Jun. (the Company's Research Chemist), says that much of the hardness was calcium carbonate, probably present as calcium bicarbonate, which was precipitated when the water encountered the ammonia compounds in the gas or weak liquor. On surfaces over which the water flowed—such as pipes, pumps, grids, &c.—fairly hard layers of scale were formed. After efforts to remove the scale economically had failed, a study was made of water softening systems; and a zeolite softener was finally selected as the one that most nearly satisfied the requirements. Since the installation of the softener no further scale has formed, and previous accumulations have gradually disappeared. The estimated gross savings from the use of soft water total over $5 a day; while the net daily saving is something more than $2.

Society of British Gas Industries.—The annual general meeting of the Society will be held at the Hotel Cecil on Wednesday, May 5, under the presidency of the Rt. Hon. Sir Alfred Mond, Bart., M.P. The annual dinner will take place in the evening. The programme will be announced later.

INSTITUTION OF FUEL TECHNOLOGY.

Many engaged or interested in various branches of fuel technology consider that the formation of an Institution is desirable, having as its principal object the consideration and discussion of all matters relating to fuel. While there are numerous Institutions in existence which give casual attention to fuel questions in connection with the particular industries represented by them, the scientific utilization and treatment of our coal resources, they think, has become of such vital importance to the country that an organization having as its sole purpose the consideration and discussion of every aspect of fuel technology is essential.

A meeting will be held at the Institution of Civil Engineers, Great George Street, S.W. 1, on Friday, March 5, at 3 p.m., to take the necessary steps to inaugurate an Institution of Fuel Technology, and to appoint an Organizing Committee which will consider the constitution and scope of the proposed Institution. Sir William J. Larke, K.B.E., Director of the National Federation of Iron and Steel Manufacturers, will act as Chairman at this meeting.

Among those interested in the formation of this new Institution are: Messrs. H. C. Armstrong (Fuel Department, John Brown & Co., Ltd., Sheffield); J. T. Atkinson (Stein & Atkinson, Ltd., London); David Brownlie (London); V. R. Chadwick (Turbine Furnace Company, Ltd., London); R. H. Crozier (London); Dr. Paul Dvorkovitz (London); Messrs. J. Ivon Graham (Mining Research Laboratories, Birmingham University); Percy N. Hambly (Coppée Company (Great Britain), Ltd., London); John L. Hodgson (George Kent, Ltd., Luton); J. E. Lea (Lea Recorder Company, Ltd., Manchester); Dr. R. Lessing (London); Messrs. Robert Maclaurin (Stirling); R. J. Milbourne (Lilleshall, Salop); J. W. Mitchley (Blair Campbell & McLean, Ltd., Glasgow); Sir Richard Redmayne (London); Dr. M. W. Travers, F.R.S. (Consulting Chemist, London); and Dr. R. V. Wheeler (Professor of Fuel Technology, Sheffield University).

PREVENTING FIRES IN COAL PILES.

The method by which loss from coal-pile fires (previously heavy) has been reduced to nothing over the past couple of years or so by the Utica (N.Y.) Gas and Electric Company, has been described in the "Factory Mutual Record." It should be noted that no change whatever has been made in the quality of coal purchased, which contains from 68 to 78 p.ct. of carbon, and from 1 to 1·45 p.ct. of sulphur. The freedom from fire is solely the result of adopting what is termed the "packing and rolling" method of storing coal.

In the first place, the coal is dropped by a bucket-crane in layers about 3 ft. deep; and it is then smoothed and packed tight by a caterpillar tractor hauling an ordinary road drag. The coal is stamped-down with a mallet around any projections extending up through the pile. Successive layers are then added in a similar manner, until the coal reaches a height of 15 or 20 ft. This may be increased to 30 ft. in a small space. The principle is to pack the coal tightly and exclude the air. The caterpillar tractor weighs about 3800 lbs., and is economical to operate. The cost of levelling and rolling is about 6 c. a ton; and the increase in storage capacity is approximately 30 p.ct.

The Philadelphia Electric Company have stored 200,000 tons of a great variety of bituminous coals by this method during the past three years, and have had no fires, even though the pile when at its maximum is approximately 100 ft. wide and 30 ft. high. The coal at this plant is spread by a locomotive crane in layers about 2 ft. thick, and levelled with a caterpillar tractor dragging a heavy roller. This is continued until the desired height is obtained. Finally, the pile is trimmed by causing the crane to remove the loose coal from along the bottom edges and place it on the top of the pile. A series of observations indicated that there was no circulation of air through the pile, and that the temperature of the interior was safe.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Gas Production at the South Metropolitan Gas Company.

SIR,—There appears to exist in some quarters a wrong impression of this Company's practice in the production of gas, which I shall be obliged if you will allow me to put right.

It is not possible to make efficiently, in horizontal settings and from North Country coal, straight coal gas of so low a quality as 560 B.Th.U. On the other hand, it is believed that this quality has a gravity appropriate to the requirements of the consumer; but I am not quite sure that the last word has been said on this point, and the advantages of being able to distribute a higher quality would be considerable. However, 560 B.Th.U. is our present standard; and in order to obtain it, we use as diluents N_2 and CO_2 added in the foul main, instead of being drawn through leakages in the retorts, &c.

It is nearly thirty-five years since any producer gas was used for the purpose of dilution, and it was given up at that time owing to difficulties in regard to illuminating power; the "No. 1 Metro" burner was not, of course, then in use. As regards therms made, last year's figure per ton of coal *as received* was 72·35 therms. If the coal used were corrected to a dry ash-free basis, the figure would then be 81·26 therms per ton. This is, of course, the *average* production from all the plant, whether at the beginning or the end of its life. The figure for a new bench of retort settings worked under test conditions would be higher. I hope to make such a test in the course of the year.

CHARLES CARPENTER.

South Metropolitan Gas Company,
709, Old Kent Road, S.E. 15,
Feb. 26, 1926.

70 Therms Per Ton.

SIR,—In a letter in the "JOURNAL" for Feb. 24, Mr. George Helps refers to a paper I read before the Institution of Gas Engineers in 1921. In referring to the results of the South Metropolitan Gas Company published in that paper, Mr. Helps, in his letter, states that "it has since come to knowledge that producer gas was mixed with the straight coal gas to regulate its density or to keep a level line in the C.V. of the gas distributed. Obviously the 70 therms was not all straight gas."

Mr. Helps is quite wrong in his statement; and had this been the Company's practice, I should certainly have mentioned it.

No producer or other gas was added to any of the coal gas included in the figures I published. The coal gas was entirely straight, and was not diluted in any way whatever.

Can it be that Mr. Helps is himself now guilty of distributing high-grade gas!

G. M. GILL.

119, Victoria Street, S.W. 1,
Feb. 26, 1926.

The Government Electricity Scheme and Gas Stocks.

SIR,—Mr. George Helps' letter in your issue for Feb. 17 brings forward a matter of great interest. Dr. Carpenter makes it clear that the electricity scheme is a matter of long-delayed policy. We gas engineers should be prepared to fight any outside competition whatsoever, upon the basis of our intrinsic superiority.

Proceeding *via* the steam engine to power as an end product, it is true that about 20 p.ct. over-all efficiency is the limit realized by present super-power stations. What has gas to say to this? Granting gasification at an efficiency of 85 to 90 p.ct.—easily obtained in my case—and a gas engine efficiency of over 60 p.ct. (using recuperative devices for recovery of exhaust losses, and working on a novel system), operating with gas of a calorific value of 350 to 450 B.Th.U., practically devoid of inerts, the "power" efficiency is 51 to 54 p.ct., readily convertible, if desired, into electricity. Further, gas engines of medium size working on such a gas would not prove troublesome, and would prove economical compared with present-day electrical station work.

Alternatively, gas-fired boilers coupled to steam turbines would afford good usage of the waste heat of the exhaust steam. When linked with complete gasification plants, a very high over-all efficiency could be maintained for even and full load conditions.

If the gas industry is alive, it will avail itself of this glorious possibility. If gas interests do not avail themselves of this opening, whom will they blame if the electricians themselves take the matter up, and so make competition keener? Complete gasification as proposed, if accompanied by low-temperature carbonization (at 750° to 850° C.) producing a large gas yield and an ordinary tar yield, would render the combination a key to all the gas industry's troubles.

W. EVERARD DAVIES.

5, Tynybedw Terrace, Treorchy,
Feb. 26, 1926.

Super "Sandwich System" versus Pulverized Coal Firing.

SIR,—In your issue for Feb. 17, the writer of the original article on the above subject refers to my letter of Feb. 11.

I might have enlarged upon the commercial and operating advantages of pulverized fuel firing, as he suggests; my main object in addressing you, however, was to point out his misstatements in the comparison made.

The writer of the article mentions that, in the *comparatively new* Dalmarnock, Barton, Barking, and Nottingham Stations, stoker firing has been adopted. He ought to bear in mind, however, that all these stations were authorized and designed several years ago, while pulverized fuel firing has only become prominent in this country within the past eighteen months. During that brief period, orders for "Lopulco" pulverized fuel fired boilers alone aggregate 288,842 sq. ft. of heating surface, including installations at the steam electric power generating stations of the Birmingham Corporation, the Borough of Derby, the Borough of St. Pancras, the Borough of Poplar, and the North Metropolitan Supply Company. The rapid advance that is being made in the application of pulverized fuel firing to steam raising and industrial furnaces is, indeed, unexampled in the history of engineering development; and there is every indication

that the system will in future be used to the entire exclusion of stoker firing, where high efficiency and economical operation are given the slightest consideration.

The writer of the article states that with pulverized fuel firing the choice of fuels is limited, by economic considerations, to those of low ash content. In actual fact, from this point of view, the choice of fuels is far wider with pulverized fuel firing than with stoker firing; and pulverized fuel boilers are operating in this country to-day—and developing an efficiency approaching 90 p.ct.—with fuels having an ash content as high as 28 p.ct. and a moisture content of 18 to 20 p.ct. Such fuels cannot be consumed on any form of mechanical stoker without considerable sacrifice of efficiency.

During the past year, I have had an opportunity of studying in great detail the economic possibilities of the pulverized fuel system of firing as applied to steam-raising equipment. As a result of this, I have reached the conclusion that, taking into account fixed charges, including interest on capital, depreciation, insurance and taxes, operating costs—including labour, power, maintenance, and fuel costs—pulverized fuel plant shows a definite net saving per unit of steam produced when burning the same fuel as a stoker plant of the same steam capacity. With the cheaper fuels available for use in pulverized form, the total cost per unit of steam produced may be reduced by 15 p.ct. to 25 p.ct. or more, depending upon the location of the plant. Apart from the greater efficiency and the many operating advantages of the pulverized fuel boiler, the increased capital outlay, as compared with stoker equipment, is therefore a first-class investment, which in the majority of cases shows a return in excess of 100 p.ct. per annum. In one plant, very favourably situated with regard to the coalfields, the estimated net annual saving as compared with stoker fired boilers corresponded to nearly 300 p.ct. interest per annum on the increased capital expenditure. The above figures are based on an evaporation of approximately 800 million lbs. of steam per annum. In the case of an installation of smaller capacity, the comparison may be less favourable to pulverized fuel; but, conversely, it will be more favourable in the case of a larger installation.

In the light of the above remarks, it must be obvious that the statement made by the writer of the article in the last paragraph of his letter altogether fails to represent the position of pulverized fuel firing in its economic aspect.

His statement that the preheating of air was introduced by a gas engineer is also, I think, in error, as it has been fairly well established that the discoverer of the principle of air preheaters was Neilson, who used air preheaters in connection with metallurgical furnaces as far back as 1829. The first gas undertaking in the world was the Company from which the present Gas Light and Coke Company originated, and this Company received its charter in 1812. It does not, therefore, appear probable that the use of preheated air was employed in the gas industry before Neilson applied the principle in connection with metallurgical work. On this point, however, I am willing to be informed, as a matter such as this must always be open to a great deal of controversy.

The writer of the article further states that, in his opinion, apart from the use of preheated air, the "Sandwich" system is the one outstanding new feature in modern power station design—a statement which is too absurd to require serious comment.

E. G. RITCHIE.

11, *Grove Park Gardens,*
Chiswick, W. 4,
Feb. 26. 1926.

REGISTER OF PATENTS.

Retorts.—No. 246,319.

MERZ & MCLELLAN, of Victoria Street, S.W. 1, and WEEKS, E. G., of Dunston.

No. 3150; Feb. 4, 1925.

This invention is particularly adapted to retorts for carbonizing or distilling solid carbonaceous material. An object is to maintain a substantially level surface on the fuel bed and to fill up any fissures that may appear in it from time to time, or to prevent such fissures from occurring. In this way even distribution within the fuel bed is obtained and a more uniform distillation accrues. It is found also that the tendency for the fuel particles to become stuck together during the distillation process is reduced; and the fuel is thus enabled to pass more readily and uniformly through the retort.

According to the invention, there is provided a rotatable scraper intended to be so mounted as to revolve in a substantially horizontal plane approximately at the normal fuel level and so shaped as to push or press a portion of the fuel on the surface of the fuel bed towards and/or against the side wall of the retort. Preferably the scraper is so shaped as also to pass a portion of the fuel towards the centre of the retort to maintain a substantially level surface. For this purpose the scraper may be formed in two parts, one of which serves to press a portion of the fuel towards the retort wall and is in lead of the other part which passes another portion of the fuel towards the centre.

The invention also includes the combination of a scraper with a rotatable fuel distributor—such, for example, as that described in patent No. 186,834 [see "JOURNAL," Vol. 160, p. 444]

Gas Wash-Boilers.—No. 246,398.

DEAN, W., of Burnley.

No. 21,191; Aug. 24, 1925.

Specification No. 212,844 describes a gas wash-boiler wherein the pan is surrounded by a casing between which and the pan there is located a corrugated directing plate for diverting the products of combustion into close contact with the wall of the pan; the corrugated directing plate extending from a point approximately level with the bottom of the pan upwards to a distance sufficient only to cover the lower portion of the pan.

According to the present invention, instead of the corrugated directing plate covering only the bottom portion of the pan, it extends from a point adjacent to the burners and upwards to a point adjacent to the top of the pan, so as to separate the pan from the surrounding casing over its whole extent. The corrugation may extend from the bottom to the top of the plate, or only for a portion of its depth, the upper portion being left plain.

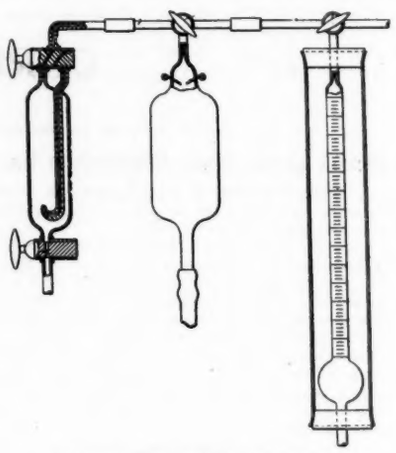
Gas Analysis Apparatus.—No. 246,665.

MURRAY, H. D., of London.

No. 2700; Jan. 30, 1925.

The apparatus comprises (as will be seen from the accompanying diagram) a burette, an intermediate vessel, and a pipette; the latter being arranged so that it can be charged or refilled with absorbent without detachment from other parts of the apparatus. The gas is caused to rise through the absorbent in a fine stream of bubbles, so as to be brought into intimate contact therewith.

The burette is a customary graduated gas burette, fitted at the top with a three-way capillary stop-cock. Of the two available leads to the latter, one communicates with the source of gas to be analyzed, and the other with a similar three-way stop-cock at the top of the intermediate vessel. The latter is connected at its base to a movable mercury reservoir, and is fitted near the top with two platinum electrodes, so disposed that the explosion of the contents of the vessel can be effected. The remaining lead to the stop-cock of the intermediate vessel is connected to a tube which passes to a stop-cock at the head of the pipette, bored in such a way that entrance to, or exit from, the pipette may be made by one of two channels; the first connecting the cock to the top of the vessel, and the second conveying the gas to a tube passing through the neck of the pipette and extending nearly to the bottom thereof—its lower end terminating in a jet bent to eject the gas upwards. The bottom of the pipette is furnished with a tube through which the absorbent solution can be drawn into, or discharged from, the pipette.



Murray's Gas Analysis Apparatus.

The pressure within the apparatus is increased or decreased by raising or lowering the mercury reservoir of the intermediate vessel, thereby enabling gas or absorbent solution to be drawn in or ejected. For the purposes of analysis the gas is drawn into the burette in the usual way, and its volume read. The taps are then manipulated so that, while the burette is isolated from the rest of the apparatus, the intermediate vessel and the pipette are placed in communication. The lower lead-in tube of the pipette is then immersed in the appropriate absorbent solution, and the intermediate vessel evacuated until the pipette is completely filled with absorbent. The taps are then adjusted to isolate the intermediate vessel, and the gas in the burette is transferred to the pipette. Following absorption the treated gas passes into the burette, where its volume is again measured. By further manipulation of the taps and by compressing the air in the intermediate vessel, the absorbent solution in the pipette may be ejected and replaced by a new solution, when the procedure described may be repeated, and the gas subjected to further absorption. Alternatively, a volume of oxygen may be sucked into the burette, and the mixture driven into the intermediate vessel, exploded, and returned to the burette, where any substance formed by the explosion may be measured by carrying out suitable absorptions as previously described.

The apparatus is portable; and many different absorbent solutions may be employed one after another without necessitating a laborious recharge of a restricted number of individual pipettes. In addition, owing to the way in which the gas is made to pass through the absorbent solution, shaking is obviated, and cleanly and rapid absorption is obtained.

Geysers.—No. 246,547.

ANDREWS, W. F., of Palmers Green, N. 13, TARPER, A. H., of Stroud Green, N. 3, and HELLYER, R. H., of Red Lion Square, W.C. 1.

No. 25,125; Oct. 22, 1924.

This invention has for its object to provide means whereby the exterior surface of geysers is preserved from tarnish, verdigris, or deterioration, and a pleasing, sanitary, and permanent exterior surface secured. An additional object is to provide means whereby radiation of heat is reduced and the efficiency increased.

According to the invention, a gas-heated geyser comprises, in combination with the usual water-containing elements, a casing and an iron sheath which surrounds the casing and carries an outer protective coating of vitreous enamel. The outer iron jacket can be satisfactorily coated with enamel; and moreover, as it is not in direct contact with the hot water, it is not so liable to changes of temperature which tend to produce cracks in the surface.

Further, the construction is preferably such that the outer iron sheath is heat-insulated from the casing by an annular space which may be filled or not. The casing within the iron sheath is separated from the water-containing elements of the geyser and is spaced therefrom, for example by connecting-ribs. The space between the casing and the water-containing elements may be furnished with an inlet at the bottom and an outlet at the top, so as to provide for the passage of heating gases. The connecting-ribs in this case serve to some extent as heating gills; and at the same time the casing does not get so hot as the water-containing element, and the outer enamelled sheath is still less heated, and cracking and discolouration of the enamel are prevented.

The locking-gear tube presents a difficulty in providing an enamelled geyser, because it must be of some non-rusting metal; and it is not possible to enamel the interior of a long narrow iron tube. For these reasons, and also with the object of increasing the efficiency of the geyser, the locking-gear tube is, according to this invention, led through the interior of the geyser by way of one of the heating passages thereof, and out at the top to a point where it can deliver into the usual funnel.

No. 246,769 (No. 30,091; Oct. 22, 1924).

In this specification the same patentees claim the special internal arrangement of the water tube, and other features of their geyser. The claims are:

That the feed-tube for supplying water extends through a heating space within the geyser and is arranged to deliver into a funnel or the like situated in the upper part of the geyser casing; the arrangement being such that the water is preheated in the feed-tube and the flow of water therefrom to the geyser can be observed.

That a plurality of water-container elements is arranged one within the other (for example, a plurality of concentric annular water-chambers) with spaces between them for the passage of heating gases from the burner; the water-feed tube being arranged within one of these spaces.

That the funnel is arranged to deliver water to a shallow tray which has communication with one of the water-container elements.

That the water-feed tube is provided with a cock which is directly interconnected with the gas-regulating tap.

That the usual interlocking control for the gas and water is characterized by the fact that the locking-gear tube is led through the interior of the geyser by way of one of the heating passages thereof and out at the top.

The combination with a geyser having a water-feed tube arranged according to any of the preceding claims, of an outer casing for the geyser having a protective coating of vitreous enamel thereupon.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 24.]

Nos. 4213-4969.

BELL, N. M.—"Gas fires." No. 4911.
BOYD, D.—"Gas regulators." No. 4616.
CLAYTON, J., and CLAYTON, SON, & CO., LTD.—"Gasholders." No. 4640.
DEMPSTER, LTD., R. & J.—"Gasholders." No. 4220.
DEMPSTER, LTD., R. & J.—"Weighting of gasholders." No. 4627.
FRONTERAS, E.—"Means for igniting gas in gas stoves." No. 4254.
HUMPHREYS & GLASGOW, LTD.—"Purification of gas." No. 4279.
JACKSON BOILERS, LTD.—"Thermostatic valves." No. 4657.
KATZ, S. H.—"Quantitative determination of gases." No. 4323.
KLÖNNE, A.—"Gasholder." No. 4458.
PEEBLES, W. C., and PEEBLES & CO., LTD.—"Gas-governing device." No. 4225.
SCOTT, J. W.—See Dempster, Ltd., R. & J. Nos. 4220, 4627.
SHEERAN, A. J.—See Dempster, Ltd., R. & J. Nos. 4220, 4627.
SIMPSON, J. F.—See Peebles, W. C., and Peebles & Co., Ltd. No. 4225.
SUGG, P. H., and SUGG & CO., LTD., W.—"Gas atomizers." No. 4298.
SUGG & CO., LTD., W.—"Gas fires." No. 4299.
TOMASELLI, T.—See Fronteras, E. No. 4254.
TRENT, W. E.—"Treating mixtures of coal and oil." No. 4306.
TRENT, W. E.—"Cracking coal and oil." No. 4307.
WILSON, S.—"Gas regulators." No. 4616.

LEGAL INTELLIGENCE.

ALLEGED MISREPRESENTATION.

In the Chancery Division on Feb. 23, Mr. JUSTICE RUSSELL heard a motion by the Gas Light and Coke Company, to restrain Geoffrey Bowen Barry from passing-off goods as the goods of the plaintiffs.

Mr. UTHWATT (for the Company) explained that, in Horseferry Road, opposite the plaintiffs' premises, the defendant had opened what was a kind of garage, but which was really an accommodation address, bearing the style of the "Gas Light and Stove Company." A young man called at the houses of the plaintiff Company's customers, offering a device for reducing the consumption of gas. The offer, according to affidavits, included a "meter beater" and a flat piece of metal for spreading the jet of gas so that a number of utensils might be heated at one time. The evidence was that the young man said he came from the Gas Light and Coke Company, with the address of 45, Horseferry Road. Outside that address was merely a wooden placard, stating the name of the concern; and the plaintiff Company had no business there. They had received many inquiries as to whether articles were sold with their authority. The suggestion was that Barry represented himself as being a servant of the plaintiff Company, and induced people to give him an order. Barry had been committed at Marylebone to take his trial on a charge in connection with the sales in question, and was now on bail until the March Sessions.

COUNSEL appearing for the defendant said there was no suggestion that anybody had been defrauded. The sale of these articles was the defendant's only means of livelihood; and what he said was that he came from the Gas Light and Stove Company. He had never represented himself to be an agent of the Gas Light and Coke Company.

His LORDSHIP: He has been singularly unfortunate in choosing an address in the Horseferry Road immediately opposite the plaintiff's offices.

COUNSEL, in reply to the Judge, said the charge levelled at Barry was that of obtaining money by false pretences. There was, however, no suggestion that the article was not a perfectly sound one.

His LORDSHIP: Then there is no doubt that he is entitled to supply it.

COUNSEL: However, in a short time a jury will decide the question.

His LORDSHIP: No order I can make can stop him from carrying on his legitimate activities. He can say "I am not Gas Light and Coke Company, though I have an address in Horseferry Road." However, plaintiffs are entitled to the injunction they ask for, to restrain the defendant, until the trial of the action or until further Order, from representing any article as being the plaintiffs, or representing that he had the authority of the plaintiffs to offer it for sale. That will in no way prejudice the charge against the defendant of obtaining money by false pretences.

Larne Gas Company's Capital.

In the Ulster Chancery Court, Belfast, on Feb. 23, before Mr. Justice Wilson, in the matter of the Larne Gas Company, Ltd., and the Companies' Consolidation Act, 1908, a petition was presented for the substitution of a memorandum and articles of association for the deed of settlement under which the Company was established. Mr. S. C. Porter said that the capital had been increased from £2100 to £9100, and a slight extension of the objects of the Company was proposed. It would be convenient for the Company to have a modern constitution, instead of the deed of settlement under which it was established over 71 years ago. He read an affidavit of Mr. D. N. Wiles (Managing Director of the Company) which stated that the undertaking was in a prosperous condition. His Lordship granted the petition.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Chorley Corporation Bill, Darwen Corporation Bill, Halifax Corporation Bill, London County Council (General Powers) Bill: Committed.

HOUSE OF COMMONS.

Progress of Bills.

Gas Light and Coke Company Bill: Committed.

Carbon Monoxide.

Mr. SCURR asked the President of the Board of Trade whether his attention had been called to the number of deaths occurring in London from gas poisoning; whether he was aware that coal gas in these days was poisonous because it contained water gas, the chief constituent of which was carbon monoxide; and whether, in view of these circumstances, he would cause an inquiry to be made with a view of making regulations for the better security of life.

Sir B. CHADWICK, in replying, said that special provision was made for recording particulars of deaths attributed to poisoning by gas used by the public. During 1925, in the areas supplied by the three London Companies, there were 27 such deaths, in which either an open verdict or a verdict of accidental death was returned. He was aware that the use of water gas in town gas increased the proportion of carbon monoxide beyond that found in ordinary coal gas. The matter was reported upon in great detail in 1924; and the Government were watching the position most carefully and closely. At present, however, it was not considered that a further inquiry would serve any useful purpose.

MISCELLANEOUS NEWS.

"B.C.G.A." GAS ESSAY COMPETITION.

Official List of First 115 Prize Winners.

No fewer than 11,000 essays, almost all of good quality, were sent in to compete for the 93 prizes, amounting to £1200, offered by the British Commercial Gas Association. In view of the many excellent essays received, it has been decided to increase the number of prizes to about 1100, and to increase the amount to £1700.

First 2 Prizes (£200 and £100) divided equally into two Prizes each of £150 awarded to:

Mrs. Dorothy M. D'Eath, M.A. (of Glasgow University), Meadowside, The Avenue, Chingford, Essex.
Mr. John Henley, Factory Hill, Glanmire, Co. Cork.

Third Prize of £50 awarded to:

Mr. G. Levo, 36, Grafton Road, Acton, W. 3.

3 Prizes each of £35 (instead of £25 as offered) to:

Mr. C. G. L. Du Cann, 6, Pump Court, Temple, E.C. 4.
Mrs. H. Kennedy, 2, Sydney Place, S.W. 7.
Mr. F. E. B. Wanstall, 31, Barton Road, Cambridge.

8 Prizes each of £25 to:

Mrs. Violet Allen, 13, Lower Church Road, Weston-super-Mare.
Mr. C. W. Bird, "Redmayes," Leighton Buzzard, Beds.
Miss Freda C. Bond, 12, West Eaton Place, S.W. 1.
Miss Gladys M. King, Swan Street, Bawtry, Yorks.
Mr. John R. Pratt, 45, Pennyman Street, North Ormesby, Middlesbrough.
Mrs. Norah Ricketts, 9, Sandhurst Road, Gloucester.
The Rev. G. H. Simpson, The Manse, Stanford-le-Hope, Essex.
Miss Gertrude E. Wiles, 3, East View, Pinderfields, Wakefield.

NOTE.—A brilliantly humorous and effective little play sent in by the well-known writer of delightful Irish stories, Miss E. Œ. Somerville, which did not comply with the requirements of the competition, has been purchased from her for £25, and will be published shortly.

6 Prizes each of £15 (instead of £10 as offered) to:

Mr. Sydney Cressy, 9, Whitehall Gardens, Victoria Avenue, Hull.
Miss Henrietta G. V. Dillon, 113, Gower Street, W.C. 1.
Mrs. Ida E. Fairhurst, 10, Havelock Street, Sheffield.
Mrs. Ida Hildyard, Wickmere Rectory, Norwich.
Mr. Roderick McKechnie, 77, Albert Drive, Crosshill, Glasgow.
Mr. F. L. Sessions, Duporth House, St. Austell.

35 Prizes of £10 each to:

Mrs. Jessie Forsyth Andrews, 283, Willesden Lane, N.W. 2.
Mr. J. H. Bailey, 32, Horsell Road, Highbury, N. 5.
The Rev. Sidney Brown, 22, Waterloo Road, Newport, Mon.
Mr. Charles Henry Coates, c/o Mrs. J. F. Roberts, 303, Whitehorse Lane, S.E. 25.
Mrs. E. M. Cunnington, Springfield Crescent, Parkstone, Dorset.
Miss Louise Davison, 22, Claremont Road, Tunbridge Wells, Kent.
Miss Maud Melville Fowler, Chelmer Park House, Riverside, Chelmsford, Essex.
Mrs. F. E. Gilder, "St. Katherine's," Bushey Grove, Watford, Herts.
Mr. Reginald Howard Gough, 12, Ormonde Drive, Muirend, Glasgow.
Mr. James Hall, 1, Redcross Street, Liverpool.
Mr. E. W. Hancock, 20, Fountainhall Road, Edinburgh.
Mr. Harold George Heath, 9, Lyndhurst Road, Exmouth.
Mr. Lionel Hewman, 25, Eccleston Road, W. 13.
Miss Gwendolen Hindes, County Hospital, York.
Mr. M. R. K. Jerram, Heather Lodge, Ferndown, Wimborne, Dorset.
Dr. Langford, 43, Ashbourne Avenue, Temple Fortune, N.W. 11.
Mr. Eric Logan, 108, Elm Grove Road, Barnes, S.W. 13.
Mr. A. Parker McCallum, 15, Haddon Street, Middlesbrough.
Mrs. H. Maitland, 205, Frederick Road, Aston, Birmingham.
Major W. L. Maxwell, "Cardington," Crowborough.
Miss Florence M. Miller, 40, Annis Road, E. 9.
Mr. John James Pigg, 18, Claremont Place, Newcastle-on-Tyne.
Mr. Percy J. Piggott, 18, Grosvenor Street, Cheltenham, Glos.
Dr. G. H. Plyman, M.Sc., Ph.D., F.G.S., St. Aubin, 47, Nicoll Road, N.W. 10.
Mr. S. Rendle, 4, Beaufort Buildings, Clifton, Bristol.
Mrs. David Rhydderch, Nantyffin, Brynawel, Aberdare.
Mr. R. T. Sharman, 103, Hunter House Road, Sheffield.
Mr. Arthur Short, 51, Talworth Street, Cardiff, Wales.
Mrs. Skelton, 13, St. Charles Square, W. 10.
Mr. Samuel Summerson, "Whiteways," Meath Green Lane, Horley, Surrey.
Mr. Daniel Sutherland, 49, Dawlish Drive, Leigh-on-Sea, Essex.
Mr. Robert George Vincent Tacey, Beacon House, Mountsorrel, near Loughborough, Leicestershire.
Mr. A. E. Tomlinson, 18, Harrow Road, Linthorpe, Middlesbrough-on-Tees.
Mr. Robert J. Troup, M.A., A.R.I.B.A., 14, Gray's Inn Square, W.C. 1.
Mr. Frank Noble Vincent, 23, Millfield Road, York.

60 Prizes of £5 each to:

Mr. T. H. Andrewartha, 86, Harold Road, Upton Park, E. 13.
Mr. Alex Barber, West Lodge, Coolhurst, Horsham, Sussex.
Major A. C. H. Benke, D.S.O., M.C., Governor's House, H.M. Prison, Preston, Lancs.
Mr. Richard Blacket (Jnr.), 3, Carey Street, York.
Mr. Eric Mackenzie Brown, Pickhill Vicarage, Thirsk, Yorkshire.
Mr. Harold Caldwell, "Bredon," Regent Road, Lostock, Bolton, Lancs.
Mr. A. T. Clouder, 27, Scotts Road, Leyton, E. 10.
Mr. Harold Conolly, Walton, Wakefield.
Miss Nancy Corbett, 121, Harbord Street, Fulham, S.W. 6.
Mr. Hilderic Cousens, 1, Holly Hill, Hampstead, N.W. 3.
Dr. E. J. Crawshaw, Martin Vale, Martin Mill, Kent.
Miss A. Crowley, 8, Martin Street, Bermondsey, S.E. 16.
Miss D. Curryer, 33, Buxton Gardens, Acton, W. 3.
Mr. Richard Wm. Davies, 112, Court Street, Blaenclydach, Glam.
Dr. J. D. Falconer, 58, Prince of Wales Road, Battersea Park, S.W. 11.
Mr. Alan George Farquharson, 6, Earlham Grove, Wood Green, N. 22.
The Rev. William H. Folley, 263, Victoria Park Road, E. 9.
Mr. George Fyfe, 20, Elgar Avenue, Norbury, S.W. 16.
Mr. David Garfield, 17, Kidbrook Park Road, S.E. 3.
Mr. Charles Anthony Geneve, B.Sc., A.M.I.Mech.E., King's College, Strand, W.C. 2.
The Rev. Frank Howorth Gornall, The Vicarage, Groombridge, Sussex.
Miss Emily Owen Greening, 19, Boones Street, Lee, S.E. 13.
Miss Evelyn Griffith, 18, Vincent Square, S.W. 1.
Miss Joyce Haward, Highway House, Beaconsfield, Bucks.
Mr. Arch. J. Haysom, Council Schools, Sandwich.
Mrs. Sylvia M. Hill, Pine Cot, Upper Parkstone, Dorset.
Miss Alice M. Hopgood, 49, Millers Road, Brighton.
Mr. Bertram Charles Joy, M.I.A.E., A.M.I.Mech.E., 168, Regent Street, W. 1.
Mr. I. J. R. de Keyser, 79, Highbury New Park, N. 5.
The Rev. Frederick William King, S. Allen Rectory, near Truro, Cornwall.
Mr. R. Levie, 216, High Street, Homerton, E. 9.
Mr. W. P. Little, 14, Stracey Road, Craven Park, N.W. 10.
The Rev. G. L. May, Easton Rectory, Winchester.
Mrs. Bessie McKillop, 3, Ferguson Avenue, Milngavie, near Glasgow.
Mr. Donald Gwyther Moore, 21, Brunswick Square, W.C. 1.
Miss Theresa M. O'Connor, Assistant Teacher, Third Public School, Rosyth, Fife, Scotland.
Mrs. Walter Osmond, 4, Bourne Avenue, Salisbury.
Mr. John Paterson, 34, Tyrrell Road, East Dulwich, S.E. 22.
Mr. Herbert Pickles, 49, Ash Grove, Leeds.
Mr. W. G. Reeves, Sidney Sussex College, Cambridge.
Mr. F. W. Rogers, The Chalet, Cashio Lane, Letchworth, Herts.
Mrs. John Rostron, 1, Sutton Street, Fenniscowles, near Blackburn, Lancs.
Mr. C. Samson, 10, Park Mansions, Battersea Park, S.W. 11.
Mr. Emanuel Sankey, J.P., "Lynwood," Allerton Drive, Liverpool.
Mr. Arnold Wilfred Sarson, 10, Bright Street, Blackpool.
Mr. Noel Shelley, 1, Mitre Court Buildings, Temple, E.C. 4.
Miss E. G. Smith, 28, Church Terrace, Heavitree, Exeter.
Mr. Ernest L. Smith, B.Sc., A.I.C., 637, Garratt Lane, Earlsfield, S.W. 18.
Miss Mavis Smith, 194, Gloucester Terrace, Hyde Park, W. 2.
Mrs. Ellen Norah Tetley, St. Martin's House, 24, Ramshill Road, Scarborough.
Mr. C. E. Turner, B.Sc., "Beth Meon," North Road, Cardigan, Wales.
The Rev. Spencer Wade, Lynesack Vicarage, Butterknowle S.O., Co. Durham.
Mr. Benson Wall, Greet, Mottingham Lane, Mottingham, S.E. 9.
Mr. Frank H. Wall, 63, Hall Road, Peckham Rye, S.E. 15.
Mr. Sidney F. Wicks, "South Hylton," Lightwood Road, Buxton.
Mr. Harold T. Wilkins, 4, Crowhurst Road, Brixton, S.W. 9.
Mrs. Muriel F. Williams, 22, Gascoyne Road, E. 9.
Dr. Oswald Hampson Woodcock, 22, Renters Hill, Golders Green, N.W. 11.
Mr. Percy Alwyn Woodcock, 9, Wood Vale Terrace, Hawksworth Road, Horsforth, near Leeds.
Mr. Lessels Yardley, 19, Colenso Road, Seven Kings.

100 Prizes of £1 1s. each.

List will be published next week.

F. W. GOODENOUGH,
Chairman of Committee of Judges.

SOUTH METROPOLITAN GAS COMPANY.

ORDINARY GENERAL MEETING.

The Ordinary General Meeting of the Proprietors of the Company was held at the Cannon Street Hotel, E.C., last Wednesday afternoon—Dr. CHARLES CARPENTER in the chair.

The SECRETARY (Mr. Frank Day) read the advertisement convening the meeting, and the minutes of the last ordinary and extraordinary general meetings. Thereafter the seal of the Company was affixed to the "Register of Proprietors."

THE ADDRESS OF THE PRESIDENT.

The PRESIDENT, on rising to address the meeting, said: Ladies and Gentlemen,—In my remarks upon the report of the Company's working during the past twelvemonth, I propose to depart from my usual custom of taking these *seriatim*, in order to refer to a matter which has caused some perturbation in the minds of certain shareholders—I mean the Government electricity proposals dealt with in Paragraph 5. We will therefore get this out of our way now, so that we can then give our undivided attention to the satisfactory year through which the undertaking has passed.

THE GOVERNMENT AND ELECTRICITY.

In the first place, I want to endeavour to make clear to you what I understand the main proposal of the Government to be; for I cannot but think a good deal of misapprehension exists with regard to it. The subject is somewhat technical, so, to make it clearer, I will take an example from the case of the railways. In the design and working of a railway system, the following are three important points that have to be borne in mind—namely, the dimension of the track or running gauge; the dimension of the structure gauge, that is the height and width of the tunnels and platforms, &c.; and, lastly, that of the loading gauge, that is the height and width of the coaches and other rolling stock. When railways were in the early stages of their development, there was no uniformity on any of these points; and this continued until comparatively recent times. England in those days was not organized as a military country, but relied for defence almost wholly upon its insularity and its fleet. Fortunately, when the great war broke out, as regards running gauge the defect of ununiformity had been corrected between the companies themselves, in order to obtain the advantage of interchangeability and through running. In other words, the companies voluntarily carried out a change which to-day the Government would have no doubt insisted upon in the interests of national security, by making the normal, or 4 ft. 8½ in., gauge a universal one. The importance of that achievement was that, with certain restrictions, in respect of loading gauge, men and munitions could be transported on rolling stock that was usable throughout the length and breadth of the country served by the railway system.

Now, I must say a word about the generation of electric energy, in connection with which also a good deal of misunderstanding appears to be present in the public mind. Currents of electric energy, such as are in use to-day all over the world, depend for their production upon phenomena discovered and examined by Michael Faraday. He found that, if one of the extremities or poles of an ordinary bar magnet was thrust into, though not touching, a coil of copper wire, a transient current, lasting about as long as the magnet was being moved, was produced, or induced, as he himself called it, in the coil of wire. When the magnet was withdrawn, a similar transient current, but flowing in the opposite direction to the first, was likewise induced in the coil of wire. Each current began to flow with the motion of the magnet, reached its maximum, and then died away. Now, if the magnet were inserted into, and withdrawn from, the coil (say) fifty times per second, then a current changing its magnitude as well as the direction of its flow cyclically fifty times per second would be induced in the coil. Such a current is termed an alternating current of fifty cycles. As regards the magnitude of the current, this depends upon, among other things, the strength of the magnet used to induce the current. Moreover, by a simple device, the two currents to which I have referred may be selected and made to flow in one direction only, when they become continuous, instead of alternating. So that you may have this state of affairs: You may have electric undertakings all over the country generating and putting into their mains currents not necessarily of the fifty cycle alternating kind I have taken as an example, but of more or fewer cycles, of greater or lesser magnitude or voltage, some continuous, others alternating.

THEIR AIM.

Now, it is this state of things that I imagine the Government, guided by the Weir report, is seeking power to correct. The report is a secret one. I have not seen it; and I can only surmise some of its contents. To-day electric energy is being applied more and more extensively as the tractive force upon our railway systems, generally where large numbers of persons have to be carried mainly at one time to and from their employment in our large cities. Indeed for such purposes it is not improbable that it will largely replace steam. What, then, is the object of coupling-up with a so-called grid-iron of cables all the electric systems of the country? I think one answer is supplied by reason of the ease with which even a large modern generating station can be put out of action. I could give you many instances gleaned from the published reports—they are, indeed, almost of weekly occurrence. For instance, during last month, at the large power station in Liverpool, a hole in the roof let in the rain, and put the whole generating station out of action, stopping factories and tramways alike. A week later a generator exploded (if that is the correct expression) with similar results. Another case was at Warwick, where the power house was flooded, and all supplies stopped for several hours. During last year there were two or three dozen instances of failure, not in out-of-the-way places, but in our important cities. Glasgow's supply failed, not in that case owing to rain coming in through the roof, but because a mouse got in the way. Such troubles are usually only productive of inconvenience and loss during times of peace, but you can easily picture how different this might be in a state of war. Viewed by an outsider—and I can claim no other point of view than such a one—I cannot imagine any other course lay before the Government than the one it has decided to adopt, of standardizing all the electric generating and distributing systems throughout the country, and coupling them up by some system of interlinking cables.

THE FINANCIAL POINT OF VIEW.

Whether a general cheapening of electric energy will result therefrom, is another matter. I, personally, do not believe it will; for the larger proportion of electric energy costs to the consumer is that entailed, not by generation, but by distribution. I think, too, that the effect upon industry of the new proposals for a widespread supply of electric energy has been greatly exaggerated. We have lately had a large collier built to replace one of our war-time purchases. Shipbuilding is, as you know, one of our greatly depressed industries; and I made inquiry as to what proportion of the costs was made up of the cost of electric energy. The figure given me was approximately 3 p.ct., so there does not seem much hope of reducing shipbuilding costs by the electric grid-iron. In our various works, and, as you know, we have eight, we use no electric machinery of any kind whatever, either for coal or coke loading or conveying, or even in the still more important case of the retort house stoking machines; and yet we supply to-day, and have done so for many years, the cheapest gas in the Metropolitan area. Lest you should think, despite this, we may be old-fashioned, may I add that the fourteen cargo cranes, as well as other apparatus, on the latest P. & O. liner, the "Rawalpindi," are actuated by hydraulic, and not electric, power. As there is to-day a good deal of loose talk about the efficiency of super-electric stations, it may interest you to know that in the process of coal carbonizing in gas-works (and not necessarily super-ones) we account for from 97 to 98 p.ct. of the energy of the coal; and of this nearly 80 p.ct. is passed on to the consumer in one form or another. A super-electric station works with an efficiency reputed to be nearly 20 p.ct. May I, in passing, also remind you that in America, which is often pointed out to us as being ahead of us as regards electricity, the gas and electric undertakings are very frequently under the same management. While it is not easy to envisage a similar state of things being general over here, I believe greater economy would in the long run accrue if our outlying villages were encouraged to include a supply of electricity with that of gas, which in almost all cases is already supplied, instead of running many miles of unproductive cables. Just one word in conclusion. The cases of the Port of London Authority and the Metropolitan Water Board have been suggested as examples of what the new Electric Authority is likely to be. Both of these are admirable examples of large-scale undertakings; but whether the consumer has derived a proportionate advantage is a matter of opinion. Now, ladies and gentlemen, I feel that I can leave this part of my task, and take up that portion with which you and I are both more conversant and more interested.

GRATIFYING DEMAND FOR GAS.

The Directors' report opens with a statement as to the demands for, and the uses of, gas. It is very gratifying that the building operations which are now going on are bringing us fresh customers; a large proportion of these being of the kind most useful to us—that is, where gas is used for lighting as well as cooking and heating. We owe this almost entirely to the replacement of upright by inverted burners, which not only greatly reduce the breakage and cost of mantles, but give considerably increased efficiency. Besides, it is a pleasant light to read and work by—a quality which is not lost even in the 1000 c.p. lamps that are so popular in South London shopping centres.

SCIENCE OF COKE PRODUCTION.

Next as regards coal. There are two important aspects of this, the gross cost and the net cost; the latter being, of course, what we pay for it less what we receive for the resultant products. Our chief bye-product is, of course, coke; and this brought us in something like a quarter-of-a-million pounds less than a year ago. So you see from this what a great influence bye-products have upon the cost of coal. It may not be generally known that for between thirty and forty years we have used nothing but coke in the boiler furnaces of our river tugs; and to-day our colliers, instead of being bunkered in the North with steam coal, are bunkered with coke alongside our works in the Thames. That is to say, the ships leave London on their return voyage with empty holds, but with full bunkers. It is a satisfactory sign of the times that throughout the country increased attention is being given to the science of coke production; and our own research department continues to be busily engaged upon the problem. Whatever may be the needs of the domestic consumer in the matter of smokeless fuel (and, I think, in this respect it is largely a matter of the right type of fireplace), it is certain that for manufacturing purposes low-temperature fuel affords no advantage over that obtainable with ordinary retort or oven coke. Our yield of gas per ton of coal continues good; and the quality of the output is being maintained with a regularity that was undreamt-of a few years since.

TAR AND AMMONIA.

I now turn to our other two chief bye-products—namely, tar and ammonia. The value of tar depends mainly upon two factors—its use for road making, and in the form of pitch for patent fuel production. Regarding the latter, we have always exercised the greatest care to keep up and improve the quality, which, as a matter of fact, can very easily be damaged by an imperfect carbonizing process. As a result, our product stands high to-day in the estimation of our buyers. A large proportion of our pitch is shipped to the Continent,

for the manufacture of briquettes. The problem of tar for road use is a much more complex one, as we have now to compete with imported bitumen, which has certain characteristics of its own. This has shown the need for more scientific methods in the preparation of road tar; and I think in the long run it will mean that tar produced in the smaller gas-works will be handled by those larger undertakings which alone have the plant and staff necessary for the purpose. Despite a dull market, our special make of sulphate of ammonia finds a ready sale both at home and abroad. Here, again, quality tells; and to-day's standards make it difficult, if not impossible, for any but the best-equipped organizations to produce a material acceptable at its true value overseas in competition with the synthetic product. By improvement in our methods, we are able to make a product for which there is as great a demand overseas as for the synthetic material. Prices are down; but, as the report tells you, this has been counteracted by economies in working which reflect great credit upon the staff. I must in like terms refer to those of our officials who are engaged in extending the industrial uses of gas, as well as those interested in bye-products, and whose services are freely placed at the disposal of actual or possible customers. For to-day we find that, in addition to producing and selling staffs, we have need of an advisory branch, as well as one engaged in research.

AN EXTENSION OF THE COMPANY'S CHARTER.

Now I want to say a few words as to our Act of last year, to the promotion of which you assented twelve months ago. Parliament has again shown its confidence in us by giving us an extension of what I prefer to call the charter of working it granted in 1920. Capital is now safeguarded as regards payment for its use; and, in addition, the whole undertaking, and everyone concerned in the undertaking, is encouraged to do his or her best to sell gas at the lowest possible price. It is in a low price for gas that our strength is founded; and stress cannot be laid upon that fundamental fact too strongly or too often. You will remember that by the Act we are entitled to divide our surplus of profit in the proportion of three-fourths to the consumer by way of reduction in the price of gas, and the other fourth equally between Capital and Labour. Your portion as shareholders is for last year an additional 1 p.ct., *plus* £10,000 carried to reserve for future use or investment. Now, last year's Act went a step further than the previous one, inasmuch as it conferred, for the first time, I believe, upon a gas undertaking, powers commonly enjoyed in other branches of the commercial and industrial world—what we have been endeavouring to do for some years by the Acts which we have from time to time promoted is to shake ourselves free from those shackles imposed—and, I doubt not, properly imposed—fifty years ago, when we were real monopolists, and which have been almost ever since hanging about our necks like an "Old Man of the Sea." Immediately following the conclusion of peace, industry throughout the country had golden visions of the dawn of a flourishing era of prosperity. We had this dream ourselves. I may remind you that, in conjunction with one of the best-known chemical firms on the Continent, we bought from the Government for a large sum a chemical works adapted for the production of those finer tar products of which Germany had the monopoly before the war. It was not foreseen then that most nations would set to work to provide their own requirements; but that was what happened, and this experience has been shared by many others.

AMALGAMATION AND ASSOCIATION.

Now there was another tendency made manifest in industry consequent upon the war—namely, the amalgamation of various undertakings into one huge concern, and under one managing board. I believe myself, as did the late Sir George Livesey, that although it is unquestionable that industrial operations may become uneconomical because of the small scale upon which they are worked, yet there is something like an optimum size which, if exceeded, may be equally uneconomical, because of the very magnitude of its scale, and the consequent difficulty, not only of ensuring adequate management, but of securing and maintaining the interests of the whole body of employees. And yet there are obvious advantages pertaining to large-scale working. Our new Act has been drafted to enable these to be enjoyed by associating interests, without thereby losing individuality on the part of either undertaking, or of goodwill of either personnel. We are now entitled to enter into capital arrangements with other undertakings, in return for which there can be exchanged, not only manufacturing and supply facilities, but the special knowledge resulting from investigation and research which can only be obtained where the business is large enough to justify the cost of a properly equipped investigating and research staff. Two or more undertakings may be thus allied in efforts to bring down costs and improve results, and thereby reduce the price of gas, which, as I have before stated, is a vital factor in the continued success of our business. We have to-day no monopoly whatever in the supply of either light, heat, or power; and we exist because we can give a supply of these requirements more cheaply and more conveniently than can otherwise be obtained. Let me give an example of how such an association as I have described could be carried out. We would take over (say) one-half of the ordinary stock of the associated company. In that way we should be deeply interested in its successful working; and any general raising of the level of prosperity resulting therefrom would be shared by the holders of the other half of this same stock. In consideration for the stock so taken over, we would issue stock of an agreed equivalent value and denomination. The same Board of Directors and the same administration, the same general managers and officials, would continue; and, not least important, the particular privileges of the employees which have grown up in one respect or another around each company as a nucleus, would be maintained undisturbed and intact. The individuality of each undertaking would be thereby maintained, while each would be strengthened by association with the other. I cannot think that a scheme of this kind could fail to appeal to gas shareholders, where such arrangements are possible and applicable. It would certainly be free from the disadvantages of some amalgamations of which I have knowledge, where in some instances these have been costly, and in some others they have not yielded the advantages to obtain which they were promoted.

SUCCESS OF CO-PARTNERSHIP.

In conclusion, I should like to pay a tribute, none the less sincere because customary, to the satisfactory working of our co-partnership. There is nothing peculiar to the gas industry in the achievement of this result; and I am sure that with the will of masters and men co-partnership could be applied to coal mining, if the attempt were seriously made. During the last strike no coal was raised in England for over three months, and its cost to this Company was £350,000. Extend those figures over the whole community, and it will be seen that no country, however prosperous once, can stand up to a continuance of such attacks upon it. Our own co-partnership has been established for well over a third-of-a-century; but I believe that it is only now on the eve of demonstrating to the full all that can be achieved by it. Just as adversity tests friendship, so competition tests industry. This, with us, is growing keener day by day; and I believe your staff and employees will rise under its stimulus to a standard of efficiency not yet imagined in the industry with which it is associated, and that this Company will continue to play its part in the economic development of gas supply during the present century, as it so conspicuously succeeded in doing during the last. I have much pleasure in moving:

> "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The VICE-PRESIDENT (Mr. Frank H. Jones): It is my pleasure and duty to second the resolution that has been put from the Chair. The whole industry is, I think, greatly indebted to the President for the success he has achieved in the promotion of the last three Acts of Parliament. My personal belief is that there is ahead a great future for gas supply undertakings.

The PRESIDENT: The motion is now open for discussion, and I shall be pleased to hear any remarks that proprietors may desire to make.

As there seems no disposition on the part of anyone to rise, I will put the motion. It is carried unanimously.

THE DIVIDEND.

The PRESIDENT: I now beg to move:

> "That a dividend at the rate of 6 p.ct. per annum be now declared, and that warrants be transmitted to the registered addresses of the proprietors by post for the amount of such dividend, less the interim dividend paid in respect of the first half of the year."

Mr. C. H. G. BELBEN: I have pleasure in seconding that.

The motion was agreed to.

RE-ELECTIONS.

The PRESIDENT: I next have to propose that Mr. E. Honoratus Lloyd be re-elected a Director of this Company. Mr. Honoratus Lloyd is an exceedingly useful member of the Board, and his counsel and advice are always of the greatest possible assistance.

Mr. FRANK BUSH: I second the motion with great pleasure, for I think we are very fortunate in having such a gentleman as Mr. Honoratus Lloyd on the Board of this Company.

This was carried.

The PRESIDENT: It is my pleasure to move that Mr. Benjamin R. Green be re-elected a Director of this Company. Mr. Benjamin Green brings to the Board a long experience in gas engineering and administrative matters, and is exceedingly valuable to us in carrying on our business.

Mr. P. RICHBELL: I have much pleasure in seconding that.

The resolution was carried unanimously.

On the proposition of Mr. A. D. PASMORE, seconded by Mr. CHARLES WEBB, Mr. Charles P. Crookenden was re-appointed an Auditor of the Company.

VOTE OF THANKS.

Mr. WEBB: Before we part, I am sure we should like to pass a hearty vote of thanks to Dr. Carpenter for presiding, and to the Board generally for their services during the past year.

The resolution was seconded, and cordially passed by the meeting.

The PRESIDENT: I can assure you, on behalf of myself and colleagues, that we are very much obliged to you all for the hearty manner in which you have passed this vote of thanks; and for the sympathetic way in which you have listened to what we have had to say.

South Normanton Gas Prices.—The South Normanton Tradesmen's Association having complained of the high price of gas, the Manager and Secretary of the South Normanton and Blackwell Gas Company (Mr. A. F. Hill) has replied stating that the present price of gas is only 37 p.ct. above the pre-war charge. From 1921 to 1925 reductions in price to the extent of 2s. 3d. per 1000 c.ft. had been made; and a further reduction of 3d. came into operation from Jan. 1 this year, making 2s. 6d. per 1000 c.ft. in all.

Sensible Heat Distillation.—"Low-Temperature Coal Distillation" was the subject of an address delivered to the Ripley (Derbyshire) Rotary Club, on Feb. 19, by Mr. Victor A. Raikes, of Sensible Heat Distillation, Ltd. The lecturer pointed out that the semi-coke from the Company's plant at Barnsley was eminently suitable for use as pulverized fuel for steam raising. It had the advantage of eliminating the element of danger attached to the burning of powdered bituminous fuels of high volatile content, and was equally as oil for steamships. Each oil-burning steamship, said Mr. Raikes, threw out of work over a hundred miners and labourers. Oil was smokeless, but so also was the semi-coke, which could, in a pulverized form, be handled as easily as a liquid.

SOUTH SUBURBAN GAS COMPANY.

Annual Ordinary Meeting.

The Annual Ordinary Meeting of the Company was held on Friday last, at the Cannon Street Hotel, E.C.—Sir J. FORTESCUE FLANNERY, Bart. (the Chairman), presiding.

The SECRETARY (Mr. Wilfrid Wastell, F.C.I.S.) read the notice convening the meeting; and after the confirmation of the minutes of the last meeting, the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, on rising to address the proprietors, said: I have to apologize for the absence from the meeting of Dr. Carpenter, our esteemed and respected colleague on the Board. He has been laid aside, I am sorry to say, by the prevailing illness of influenza, and for that reason he is unable, to his regret and to our own, to be present with us to-day.

MR. CHARLES HUNT'S RESIGNATION.

In moving the adoption of the report and accounts, I desire, in the first place, to refer to the retirement of Mr. Charles Hunt. Mr. Hunt was, with the exception of myself, the senior member of the Board, because he joined as a Director in July, 1902, nearly 24 years ago; and he succeeded the late Mr. Robert Morton as Chairman in March, 1909, and held that office with distinction and success until a year ago. For nearly twelve months past Mr. Hunt has been unable, on account of his health, to attend the meetings of the Board, to the great regret of his colleagues; and it was with feelings of the greatest sympathy, which I know will be shared by the whole of the stockholders of this Company, that we received towards the end of last month a letter from Mr. Hunt resigning his seat on the Directorate, owing to continued ill-health and advancing years. A special resolution has been passed by the Board thanking Mr. Hunt for his long and valuable services, and expressing the hope that the rest and freedom from responsibility may add to his happiness and prolong his life for many years to come; and I am sure that every stockholder and co-partner will join cordially in these sentiments.

THE NEW SPIRIT IN INDUSTRY.

"The New Spirit in Industry" is a favourite cry now in the newspapers, and without doubt the remarkable speech of the Prime Minister last session has aroused public opinion to an extent that never existed before in favour of the organizer and the worker and the capitalist—that is, the man who provides the tools and lends them to the worker—all sharing in the common profits of their common enterprise. The gas trade has for over a generation gone even further. It has included the consumer or customer in the partnership, because he pays less for his gas as profit on its manufacture increases. The South Suburban Gas Company has been running for 31 years upon these lines; and if the community at large and every industry within this country were to adopt the same principles, strikes and trade disputes would come to an end, and the greater output of each worker would enable our industries to compete with overwhelming success against those of the rest of the world.

STEADILY INCREASING BUSINESS.

You will remember that the original district in which your Company had statutory powers of gas supply was at first limited to the residential and commercial area around the Crystal Palace, and that at successive periods new territory in Kent and in Surrey was incorporated in the Company's area; that territory being much more rural and less densely inhabited than the original territory, although it contains some factories and small towns of rising importance. This enlarged Company has therefore a future before it of a most hopeful character, because of the large area of choice building sites still unoccupied; and already this advantage, as compared with districts where all available sites are already built upon, is even, in the present figures of the report for 1925, definitely showing itself. In order to meet the increasing amount of business which the construction of new houses to fill the clamorous public demand for accommodation has created, it is necessary for your Company to continually supply new stoves, new meters, and new mains laid under ground; and at every Board meeting fresh indents are brought forward by the officials, and all of them supported by definite applications from consumers who will take gas when the supply mains and other apparatus are in working order. All this is encouraging, and very satisfactory; but it involves a steady sinking of new capital, month by month, and year by year, so that now the Company is already considerably indebted to its bankers, largely because of the absorption of capital from the causes to which I have referred.

THE YEAR'S TRADING.

I am pleased to be able to tell you that we have had another very successful year's trading. As you will see from the report, the quantity of gas sold during the year under review is 5·7 p.ct. more than the previous year's figure. The number of consumers has increased by 3597; and the number of gas cookers, fires, and other apparatus hired and sold to consumers has increased by 10,481—a record experience for this Company. At the risk of wearying you, I should like to give you a few facts and figures to indicate the extent to which the Company's business has developed during the past few years, including the stagnant period of the war. In 1912, immediately before our amalgamation with the Bromley and Crays, West Kent, and Dartford Gas Companies, there were in the Company's area 40,676 consumers, and 35,550 cookers and fires on hire. In that same district to-day there are 54,583 consumers, and 66,219 cookers and fires on hire; while the volume of gas consumed during 1925, as compared with 1912, has increased by a quantity sufficient to supply a town of the size of Eastbourne with all the gas it requires for twelve months. That, I want to emphasize, is in the 15 square miles of district which constitute the original South Suburban area or Crystal Palace district. Now the amalgamation with this Company of the undertakings I have mentioned, and the development of their districts, has resulted in the following remarkable progress. The number of consumers in 1912 was 40,676, while to-day in the whole area there are 95,549. The number of cookers and fires on hire in 1912 was 35,550, whereas to-day, in the amalgamated area, the total is no less a figure than 110,734; while the increased quantity of gas consumed in the whole area during the year 1925, as compared with 1912, would supply the city of Coventry with all the gas it requires for twelve months. Further, during the past three years there has been a marked acceleration in the rate of expansion of the Company's business. The quantity of gas sold has increased by 21¼ p.ct., the number of consumers by 9000, and the number of cookers and fires hired and sold by 22,000. I have ventured to dwell somewhat fully upon this point, as it has a direct bearing upon the references I will make later when dealing with the question of capital.

THE FINANCIAL POSITION.

A perusal of the statement of accounts which you have all received will, I think, indicate to you that, all circumstances taken into consideration, the financial position is far from being unsatisfactory. Turning first to the revenue account, the total cost of the manufacture of gas is about £21,000 less than for the previous year, notwithstanding the material increase in the quantity of gas made and sold. This gratifying result is due to a reduction in the prices of coal, oil, &c., and to an improvement in the working results, due to the skill of our staff, under our Chief Engineer, Mr. John Terrace. Every year as we go on we get better results and greater economy in production. The figures under the head of distribution show an increase of about £23,000, which is entirely due to the increase in business to which I have referred. All the other items on the debit side of the revenue account show little variation from the previous year, and are quite normal. On the credit side of the account, however, the figures tell a somewhat different story. The increase in income from the sale of gas of some £90,000 is due partly to the fact that we were compelled to raise the price of gas as from the end of the Lady-Day quarter 1925, to meet the declining income from residuals, which at that time it was estimated would amount to a very considerable sum for the remainder of the year. Our estimates, in fact, have proved to be remarkably correct; for the income from residuals, coke, tar, and ammonia, shows a decrease of no less than £72,000, and it is small comfort to know that our experience is a common one shared by all other gas undertakings.

THE PUBLIC DEMAND FOR COKE.

Our outlook for coke at good prices is, however, a favourable one. In fact, the growing demand for graded coke has increased to such an extent that we have at times been unable to meet it; and although about twelve months ago we installed and put into operation a coke screening and grading plant, which we anticipated would enable us to deal with this part of the coke business for some time to come, we have now under construction another and larger plant to supplement the original one. There is no doubt that coke is daily gaining in favour as the most satisfactory fuel for use in coke boilers and central heating plants. Two of our Directors, Mr. Gundry and Col. Boraston, were good enough to form themselves, at the request of the Board, into a Sub-Committee on Coke, to study this important matter along with the officials, in order that we may make the best of our market in what seems to be a very promising field. With regard to tar, there is no indication at the moment that the market is likely to improve in the near future; but it is not anticipated that this year's income from that source will fall below that of last year.

CAPITAL.

If you will turn to Capital Account C, you will see that the balance overdrawn is £356,949, a figure resulting largely from the development of the Company's business previously mentioned. This debit balance arises from the fact that to a large extent we have in recent years been compelled by force of circumstances to meet our capital indebtedness by way of a loan from our bankers, instead of by the issue of stock. Your Directors have given frequent and serious consideration to this question of capital, and we have come to the definite conclusion that it would be impolitic to increase the indebtedness to our bankers much beyond the figure on Dec. 31 last—namely, £400,000. We therefore propose in the near future to invite tenders for a considerable sum of ordinary stock; and we have every confidence that the response will prove to be as satisfactory as on the last occasion—about fifteen months ago—when the £100,000 we required was applied for nearly four times over, the greater part of it being issued to our consumers and stockholders. This constant and insistent demand for fresh capital is the natural corollary to the steady growth of the Company's business, to which I have already referred.

STANDARD PRICE.

You will also notice that reference is contained in the report to an application we are making to the Board of Trade for an Order under section 10 of the Gas Regulation Act, to amend the Company's standard price, to increase the borrowing powers of the Company, and for other purposes. Though I shall follow usual practice in such matters, and ask our Solicitor, Dr. Blyth, to be good enough to explain in detail to this meeting the provisions of the proposed Order, I should like to refer somewhat fully to this question of standard price, in an endeavour to explain its due import, and remove misconception from the minds of consumers, and possibly of stockholders also. To make the position clear, I am afraid I must weary you with a little history. The Company's Act of 1893 contains provisions for the control of dividend by what is known as the sliding-scale. These provisions were introduced to identify the interests of consumers and shareholders by allowing an increase of dividend as the price of gas falls; the main inducement to reduce the price being the fact that the lower the price at which gas can be sold, the better can the Company hold

its own in competition. Briefly, under this scheme the rate of dividend rises as the price charged for gas falls, and falls as the price of gas rises; these fluctuations being governed by definite factors—namely, the standard dividend, which in the case of this Company is 5 p.ct., the standard price, which at present is 15d. per therm, and the increment of possible dividend, which is 3s. 4d. p.ct. for each variation of one-fifth of a penny in the price charged for gas. During the war the gradual inflation of prices adversely affected the dividends of sliding-scale companies to such an extent that a temporary Order was made in 1918 providing for a minimum dividend on sliding-scale stocks; this figure in our case being 3¾ p.ct. When the Gas Regulation Act of 1920 was passed, we made an application to the Board of Trade, in common with many other gas undertakings, for a new standard price that would secure a fairer dividend to the stockholders of the Company. That price was 15d. per therm, and was based upon the pre-war standard price *plus* an addition to meet the increased costs in 1920 incidental to the production and supply of gas. Since 1920, however, these costs have fallen, and on the application of the London County Council, the Board of Trade have reduced the standard prices of certain London Gas Companies, and were to have dealt with this Company's case for revision early in November last. On the day fixed for the hearing, however—a hearing which was attended by most of the members of the Board as well as Counsel representing the Company and the Company's Solicitor—we made an application to the Director of Gas Administration for a postponement of the case, in order to give this Company an opportunity of making application to the Board of Trade for an Order under section 10 of the Gas Regulation Act, instead of under section 1, as by so doing the Company would be enabled to use arguments in support of their case, which would not be admissible under section 1, and would also be able to seek for other necessary powers, apart altogether from the question of standard price. To this the County Council assented, reserving their right to criticize the proposals of the Company. An application for an Order has been lodged with the Board of Trade, the hearing of our case being fixed for Monday, March 1. We are very anxious that justice should be done to the Company in regard to the standard price; and we have every reason to believe that we shall have a fair hearing and a fair result.

NEW DEVELOPMENTS IN LIGHTING, POWER, AND HEAT.

The customs of the British people as regards illumination have become revolutionized during the last two generations; and the artificial light which did little more than make darkness visible, but which satisfied our grandfathers, has been replaced by a customary brilliance of illumination, in business, and for domestic and social purposes, which is now so usual as to be treated as a matter of course. Then, again, the system of supplying power and heat from a central works where coal is reduced to its elements has become increasingly popular because of the economy and labour saving of such a system, as compared with the old-fashioned custom of separate production of power from separate coal furnaces or open fires; and I venture to prophesy that the system of communal or co-operative supply of heat and power, as well as of light, will increase, so as to become almost universal in the not distant future. In the developments I have endeavoured to indicate prosperity will be found, and demands for the employment of an increased number of men and women. I think it will be helpful if I quote some passages from a speech delivered by the Minister of Health, Mr. Neville Chamberlain, only in December last. The occasion was the unveiling, in the hall of the offices of the Corporation Gas Department in Birmingham, of a bust of the late Mr. Joseph Chamberlain, to commemorate the jubilee of the Department and the important part played by the late Mr. Joseph Chamberlain in gas development, and in its acquisition and early administration by the Birmingham Municipality. After referring at some length to the development of the undertaking during its fifty years of municipal ownership, Mr. Neville Chamberlain said:

> "But there are some other departments which are of peculiar interest to a Minister of Health. If you study the statistics which are published every year by my Department, you will find that the most fatal forms of disease are not tuberculosis, and not even cancer; they are those which affect the respiratory system. A couple of days of fog, such as we had in London last week, sends up the death-rate immediately; and that is largely due to the fact that the fog holds in suspension the particles of the unburnt fuel which are continuously pouring out of our industrial and domestic chimneys."
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> "I cannot doubt that this great development at the expense of the old raw coal fire has had a very large part in the cleansing of our atmosphere, of which, I think, most of us older ones are conscious."
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> "I anticipate that in the near future the present Government will be introducing legislation which may have the effect of bringing about a very considerable development of electricity. I venture this prophecy—that that development will be supplementary to, and not in substitution for, gas. It seems to me that this vast undertaking of ours is now so securely based, so scientifically managed, so progressive in its methods, so firmly rooted in the affections of the people, that it has nothing to fear from any other form of energy; and that it will have its own field which is, at present, untouched by anything else. And so I feel confident that, in celebrating its jubilee to-day, the Gas Department cannot merely look back upon fifty years of constant and remarkable progress, but can turn to the future with a complete and well-founded confidence that it is going to be as prosperous, as distinguished, and as beneficial, for the comfort and the health of the community, as in the past."

I am optimistic enough to believe that Mr. Neville Chamberlain's prophecy that the development of the supply of electricity will coincide with the continued supply of gas will prove to be true in the case of every progressive light, power, and heat undertaking in the country. The energizing effect of healthy competition will, I am confident, continue to stimulate the technical, scientific, and commercial brains of industry, as it has done in the past. We have not by any means reached finality in design and construction of plant for the economical production of light, power, and heat, any more than we have reached finality in the design and construction of fittings for their economical application; and, again in the words of the Minister of Health, I, too, feel assured that we may turn to the future with a complete and well-founded confidence. I now beg to move:

> "That the report of the Directors, and the accounts examined and signed by the Auditors, be received, adopted, and the report entered upon the minutes."

Col. BORASTON said that, were it not for the opening passages, he should do no more than formally second the motion, after the extremely able, comprehensive, and encouraging record contained in the Chairman's address. He would, however, like briefly to associate himself with what the Chairman had said with regard to their old friend Mr. Charles Hunt, who had not only given long and valuable service to the Company, but had for a great many years occupied a leading position in the gas industry. He was sure they all wished Mr. Hunt many years more of quiet, peaceful, and useful life.

Mr. CHARLES WEBB asked if the current price of the Company's stock would be taken into account when offering fresh stock, and when the issue was likely to be made.

Mr. JOHN RANDALL said he was pleased to hear the Chairman refer, as he had done on various occasions, in such favourable terms to the co-partnership principle; and he was sorry they had not Dr. Carpenter with them. He (the speaker) had read the speech delivered two days ago by Dr. Carpenter at the meeting of the South Metropolitan Gas Company, and from this he gathered that there had been further provision made for co-partnership, by which the co-partners would receive a rather higher proportion than they had in the past. As Dr. Carpenter was also a Director of the South Suburban Gas Company, he would no doubt put his views before the Board; and if the South Metropolitan scheme was better than their own, it would probably be an advantage to give their co-partners the same terms as the other Company did. He himself had been a worker in the industry for over fifty years, though not, unfortunately, under a co-partnership scheme; and he believed an extension of the principle would be of benefit alike to employees, shareholders, and consumers.

The CHAIRMAN replied that the current price of the Company's stock would be taken into consideration when offering fresh stock. This issue would be made at a very early date. There had recently been many new issues which had been very successful; and he had every reason to believe that their own issue would be equally so. The Directors heartily welcomed any words of encouragement upon the subject of co-partnership. Mr. Randall had mentioned the fact that he had worked his own way up; and this was the case with many members of the Board. He (the Chairman) began at 6s. a week in a workshop; and he had the utmost sympathy with the principle of interesting the worker as a co-partner with all the others engaged in an enterprise. As regarded the suggestion that the scheme of the South Metropolitan Company, which differed somewhat from the scheme which had hitherto been applied to their own Company, should be considered by the Board, he could assure Mr. Randall that this would be fully dealt with. The policy of the Board, in conjunction with Dr. Carpenter, would be to take the best points out of every scheme, and adopt it for the benefit of their co-partners.

The report and accounts were then adopted unanimously.

THE DIVIDEND.

The CHAIRMAN next proposed:

> "That a dividend for the half-year ended Dec. 31 last be now declared at the following rate per annum—viz., 6¼ p.ct. on the ordinary stock, less income-tax; and that warrants for the net amounts be forwarded on the 11th prox. to the registered addresses of the proprietors."

Mr. C. J. CARTER (who made his first appearance before the shareholders as a member of the Board, having recently been elected a Co-Partner Director) seconded the motion, which was agreed to.

BORROWING POWERS.

The CHAIRMAN moved:

> "That the application of the Company to the Board of Trade for a Special Order under Section 10 of the Gas Regulation Act, 1920, to increase the borrowing powers of the company, be, and the same is hereby, approved."

He said he thought he had already sufficiently explained this matter in his speech. They wanted to be able to borrow larger sums, because of the expanding business.

Mr. W. G. WALLER seconded the resolution.

Dr. BLYTH (the Company's Solicitor) went through the clauses of the Order *seriatim*, and explained that the objects were to increase the borrowing powers from one-third to one-half of the issued capital, in accordance with modern practice, and to take authority for the issue, if thought desirable, of redeemable debenture stock.

The resolution was passed.

RE-ELECTIONS AND THANKS.

Mr. H. GUNDRY proposed the re-election as Directors of Sir J. Fortescue Flannery, Mr. Alexander Dickson, and Col. John H. Boraston. He said they were all well-tried members of the Board. Sir Fortescue Flannery had been a Director for nearly 24 years, and had been most valuable to them in this capacity. ["Hear, hear."] On the retirement of Mr. Hunt, he was elected to the chair; and, as might be expected, he had performed the duties with conspicuous ability. Mr. Dickson had been a Director for fourteen years; and they all knew what a keen interest he had taken in the affairs of the Company. His long experience of gas administration he was always ready to place at the disposal of the Company. Col. Boraston had been a Director for more than five years. He succeeded to the seat at the Board which his father, Sir John Boraston (the loss of whom they all

sincerely deplored) formerly occupied. Col. Boraston was one of the most hard working men it was possible to find; and he was most useful to the Board in legal matters. He had done much, and was doing much, by speaking and otherwise, to further the cause of co-partnership.

Mr. B. R. GREEN seconded the proposition, which was unanimously passed.

On the motion of Mr. A. E. BROADBERRY, seconded by Mr. A. J. KINGDON, the retiring Auditor (Mr. Alfred Morland) was also re-appointed.

Mr. A. M. PADDON, in proposing a hearty vote of thanks to the Chairman and Directors for their services during the past year, referred to the Government's electricity proposals, and asserted that the gas industry had nothing to anticipate in an adverse sense from any move that the Government might make. If the Government wished to help the electrical industry, this did not constitute any menace to the gas industry; but personally he should not have thought that the electrical industry stood in need of any assistance. The South Suburban gas undertaking could not be in better hands than it was.

Mr. CLIFFORD HUNT, seconded the vote, which was agreed to.

The CHAIRMAN said that he and his co-Directors were very much obliged to them for the vote, and he was sure that the staff and employees would also be grateful, for they likewise shared in any thanks for the good results that had been achieved.

BOURNEMOUTH GAS AND WATER COMPANY.

Ordinary General Meeting.

The Ordinary General Meeting of the Company was held on Friday, Feb. 26, at the London Offices, No. 48, Copthall Avenue, E.C.—Mr. WILLIAM CASH, F.C.A. (the Chairman), presiding.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting, and the minutes of the last annual meeting; and the Directors' report and statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, remarked that this was the first time the proprietors had met in the new London Offices; and it was rather interesting to note that for very nearly fifty years the half-yearly and yearly meetings of the Company were held at the old offices in Cannon Street.

REMARKABLE GROWTH OF BUSINESS.

In presenting the report and accounts for the past twelve months, he could repeat what he said a year ago—that the outstanding feature was the growth of the Company's business. The sales of gas had been 7¾ p.ct. more than in 1924; and he might remind the proprietors that a year ago the sales were up 9·84 p.ct. So that over the two years there had been an increase in gas sold of very nearly 300 million c.ft., or 18 p.ct.—an extraordinary growth for any company within a period of only two years. They had finished, so far as the initiation was concerned, the new works at Pitwines, Poole; but they had, of course, been designed with a view to future extensions. To-day they were capable of making, as they stood, some 4½ million c.ft. of gas per diem; and ultimately they would have a daily capacity of 12 millions. Reverting to the growth of the Company's business, he might mention that during the month of December their maximum day's output (which was on the 4th of the month) was 8,800,000 c.ft., which was an increase over the corresponding day of the preceding year of no less than 43 p.ct. The previous maximum day's output was 7,500,000 c.ft.

THE NEW SHOWROOMS.

Reference was made in the report to the new showrooms; and it might interest the proprietors to know that the turnover in respect of apparatus, &c., sold from their showrooms was over £50,000 a year, and that more than 10,000 cookers, fires, and water heaters were fixed. During the year 2548 new gas services were laid, and 1299 new water services. The number of gas consumers increased by 2332, and of water consumers by 1344.

THE NEW WORKS JUSTIFIED.

They had laid during the year 17½ miles of mains; and as an indication of the volume of business transacted, he might say that they used a length of wrought-iron pipe which would reach from those offices to Weymouth, via Bournemouth, which was 135 miles. With figures of this kind before them, the proprietors would doubtless agree that the policy of the Board in spending a large amount of money on new works had been thoroughly justified. He would like at this point to emphasize what was said in the report as to the new works. These had been excellently designed and admirably carried out, and reflected great credit on their Engineer and General Manager. He had himself just seen them at work; and they were certainly most interesting and well-designed works, and were fitted with every modern appliance.

FIGURES FROM THE ACCOUNTS.

Turning to the expenditure side of the capital account, it would be seen that they had spent during the year a very considerable sum—nearly £200,000. So far as the gas undertaking was concerned, this was mainly on the Pitwines Works, the completion of the new holder at Christchurch, and the showrooms at Bournemouth. On the water side of the business, the chief outlays had been on the additional pumping plant at Longham, and the commencement of the new filter house. On the other side of the account, they had received £125,000 nominal of new preference capital, which was applied for more than twice over, and £75,000 nominal of "B" ordinary shares, which were applied for nearly three times over at satisfactory prices. In the gas revenue account, the money derived from the sale of gas was up by no less than £44,154. This was due in part to the fact that the price of gas had been raised at Lady-Day, 1925, from 8·6d. to 9·5d. per therm; and this realized a net increase of a little over 3½d. per 1000 c.ft. So that of the total increase about £21,000 was owing to the increased price of gas, and the remainder to growth of business. Rentals of stoves and meters showed a satisfactory increase of nearly £1800. From residuals they had received very nearly the same amount in total money; but, of course, the prices had been very considerably less. As a matter of fact, the drop in prices was equal to over 1d. per 1000 c.ft., so that, although coal had fallen a little in price per ton, the net cost was actually up by nearly 0·6d. per 1000 c.ft., or £4744. At the bottom of the revenue account it would be seen that the gas profit was more by £23,972. He would like to draw their attention to the special appropriation for the co-partners' pension fund of £4100 in the gas account and £900 in the water account, making together £5000. The Company guaranteed the solvency of this pension fund; and it had been thought well to strengthen the fund, which had not yet been drawn upon, by this special appropriation.

RETURN ON CAPITAL EMPLOYED.

Coming now to the water account, there was a satisfactory increase in rental of £4689, while the profit on revenue account was more by £1834. Taking the combined figures in the profit and loss account, it would be seen that the total increased profit was £25,806. On the other hand, of course, they had to meet a bigger demand in respect of dividend on the new capital of some £10,000. But in this connection there was an interesting fact to be noted—namely, that the charge for the use of capital (that was to say, debenture stock interest and all the dividends) expressed as a percentage over the total money raised, which was £1,526,595, was only £5 1s. p.ct. The consumers should appreciate the extraordinarily low rate of remuneration the capital was getting on the average, due partly to the small return on the debenture stock, and partly to the large premiums subscribed when capital had been issued. With regard to 1926 he had little to say, except that residuals showed very little signs of recovery so far; but the Company would be doing rather better after June 30 in the matter of coal, because new contracts had been entered into at a price which would give some substantial relief in that respect.

THE GOVERNMENT AND ELECTRICITY.

A great deal had appeared in the Press lately as to the scheme to be put forward by the Government, and in the forefront of their programme, for the development of the supply of electrical energy throughout the country. The government, proposed, *inter alia*, to grant the electrical industry financial assistance to this end by the provision, through the Trades Facilities Act, or some amendment thereof, of cheap money. The electrical industry did not seem to be unanimous in their attitude to the proposals or particularly grateful for the proffered boon. If at a gas meeting one was allowed to comment or criticize, there did not seem to him to be any evidence of a poverty-stricken or tottering industry requiring assistance to stave-off an early appearance in the bankruptcy court, or anything of that kind. The object of unification of method of supply might be excellent; and, of course, the cheapening of the cost of electrical energy to the consumer was a proper and desirable object. In Bournemouth, the growth of the Company's business in the past was eloquent of the demand for a supply of gas in its manifold modern and daily uses; and contemporaneously electric supply had progressed. He observed that their friends in the Bournemouth and Poole Electricity Company proposed to pay in respect of 1925 a dividend of 10 p.ct., and 4 p.ct. bonus, free of tax; while at the end of 1924 their carry forward and reserves, including reserves for depreciation, amounted to over £250,000. In fact, as he had said to the shareholders on previous occasions, there was room for both; and in their own Company, by reason of their situation, moderate capital, modern methods, and constant efforts to give customers what they wanted as they wanted it, and at a price they might be satisfied with, coupled with courtesy and efficiency, they stood in an excellent position to continue in the future, as in the past, to hold their own successfully. But they did ask for fair and equal treatment of the gas industry with the electrical industry. This advertisement of electricity had apparently caused some gas shareholders a measure of apprehension. At Bournemouth, for the reasons he had indicated, he did not think their stockholders need have any qualms. Theirs was a dual service of both gas and water, which further strengthened their position in ways both direct and indirect; and he saw no reason why this undertaking should not in the future continue to prosper, while it fulfilled, as it most certainly did, a useful service to the community.

The DEPUTY-CHAIRMAN (Sir Charles L. Morgan, C.B.E.) seconded the motion.

Mr. R. CUFF said it gave him great pleasure to see these accounts, which redounded to the credit of the Chairman and Directors, the staff, and the workmen. The results showed them what co-operation had done for the Company. Carbonizing wages had gone up £1880; but the Company had sold 138 million c.ft. more gas. Evidently all shoulders had been put to the wheel; and therefore everybody was to be congratulated on the result. He had been particularly pleased to see the special appropriation of £5000 to the co-partnership pension fund, because the shareholders depended upon the workmen, as well as on the "ruling powers," in carrying the operations to a successful issue.

Mr. H. G. PALMER expressed the hope that the Chairman's speech might be read widely, because it was important that the general public should know that the gas industry could live in conjunction with the electrical industry.

Dr. G. H. RODMAN said the Chairman had told them it had been

necessary to raise the price of gas; but this did not seem to have had any effect on the distribution.

The CHAIRMAN replied that wages were slightly higher per 1000 c.ft.; but this was because they were raised nationally in January, 1925. The meeting would be reported fully in the "GAS JOURNAL," and a summarized report would also appear in "The Times." They were not, of course, paying the full dividend that they might do at the present price of the gas.

The report and accounts were then unanimously adopted.

THE DIVIDEND AND RE-ELECTIONS.

On the proposition of the CHAIRMAN, seconded by Sir CHARLES J. JESSEL, Bart., it was resolved that the interim dividends to June 30 at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 8¼ p.ct. on the original shares, be confirmed; and that dividends for the second half-year be declared at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" shares, and 8¼ p.ct. on the original shares.

The DEPUTY-CHAIRMAN proposed that Mr. William Cash, their very eminent and able Chairman, be re-elected a Director of the Company.

Sir CHARLES JESSEL seconded this, and it was agreed to.

The CHAIRMAN proposed the re-election to the Board of Mr. E. Honoratus Lloyd, K.C., who was a very valuable Director.

Lieut.-Col. H. W. WOODALL, C.I.E., seconded the resolution, which was carried.

Moved by Dr. RODMAN, and seconded by Mr. PALMER, the retiring Auditor (Mr. Lewis Hardy, F.C.A.) was re-appointed.

A VOTE OF THANKS.

The CHAIRMAN said he had much pleasure in proposing a hearty vote of thanks to the Engineer and General Manager and his assistants, the Secretary, officers, and workpeople for their services during the past year. The Engineer and his staff had had a very strenuous time in carrying out these new works, which were, as he had said, excellent. The Board were not alone in this opinion; for last year the Southern Association of Gas Engineers and Managers (of which Mr. Moon was the President) met at Bournemouth, and the Directors were present to welcome the members, who were extremely eulogistic in their remarks. The new station was enormously admired by them, and, of course, they knew what they were talking about. They were unanimous in saying that the works were ones of which any company might be proud, and were the last word in gas-works construction. Everything, too, had been done without calling in any consulting engineer. As a matter of fact, the Company were served well by all ranks, from top to bottom.

Mr. R. H. GLEN seconded the vote, remarking that the figures in the accounts formed excellent testimony to the admirable manner in which the Company were served.

Mr. PHILIP G. G. MOON (the Engineer and General Manager), in acknowledging, on his own behalf and on behalf of the staff at Bournemouth, the vote, which had been heartily passed, said it had been a busy, but an interesting and happy, year; and any measure of success that had been achieved had been due in large part to two outstanding factors. One was that they had had the expert guidance and very generous support of a Board of Directors who were, to his mind (if he might be pardoned for saying so), absolutely the best Board—because they were all experts themselves—in the kingdom. It was a pleasure to serve them. The other factor was the loyal co-operation and enthusiastic support of every member of the staff, from the humblest labourer right the way up. Every one of them was proud of belonging to the Company; and such a spirit must make for good work. It was the boast of all that they worked for the Gas and Water Company; and, in their view, everything that was good came from the Gas and Water Company. They knew it was up to them to maintain this reputation; and they worked their hardest to do so.

EXTRAORDINARY MEETING.

An Extraordinary General Meeting of the Company was then held for the purpose of:

1. Rescinding the resolution passed by the proprietors at an Extraordinary General Meeting of the Company held on Friday, Feb. 16, 1923, authorizing the Directors to exercise the borrowing powers of the Company under the Bournemouth Gas and Water Acts, 1873 to 1913, as extended by the Bournemouth Gas and Water Company (Capital Issues) Consent, 1921, by creating and issuing irredeemable debenture stock to an amount not exceeding the sum of £33,333, and carrying such fixed and perpetual interest not exceeding £4 p.ct. per annum.
2. Rescinding the resolution passed by the proprietors at an Extraordinary General Meeting of the Company held on Friday, Feb. 29, 1924, authorizing the Directors to exercise the borrowing powers of the Company as extended by the Bournemouth Gas and Water Company (Capital Issues) Consent, 1921, by creating and issuing £66,667 irredeemable or redeemable debenture stock, and carrying such fixed and perpetual interest not exceeding £4 p.ct. per annum.
3. Authorizing the Directors to raise additional capital in accordance with the provisions of the Bournemouth Gas and Water Act, 1919, by the creation and issue of 10,000 ordinary ("B") and/or preference shares of £10 each limited as to the ordinary ("B") shares as to dividend in any one year to the sum of £7, and as to the preference shares to £6 respectively for every one hundred pounds actually paid up on such shares, exclusive of any sum paid by way of premium.
4. Authorizing the Directors to exercise the borrowing powers of the Company under the Bournemouth Gas and Water Acts, 1913 and 1919, by the creation and issue of irredeemable debenture stock to an amount not exceeding £100,000 and that such debenture stock be issued at such times, in such amounts and manner, on such terms, and subject to such conditions and with such rights and privileges as the Directors shall think fit.

The CHAIRMAN pointed out that the effect of the proposals would be to rescind resolutions giving the Directors power to create debenture stock under the Capital Issues Act, which had now come to an end, and to authorize them, in place of this to issue new "B" or preference shares and debenture stock. It was still necessary for them to spend money. They were engaged now on a new sulphate works and also on additional purifying plant; and they were spending money on filters at Longham. Besides this, they were within measurable distance of requiring a new holder. He therefore moved resolutions in accordance with the purpose of the meeting.

The DEPUTY-CHAIRMAN seconded these, and they were unanimously agreed to.

The proceedings concluded with a vote of thanks to the Chairman and Directors, on the proposition of Mr. GLEN, seconded by Mr. CUFF

CROYDON GAS COMPANY.

The remarkable development of the area served by the Company was reflected in the annual report presented by Mr. WM. CASH (the Chairman) at the meeting on Friday.

The CHAIRMAN said that the substantial increase of 4·73 p.ct. in the sale of gas, as compared with the previous year, could be regarded as eminently satisfactory. During the year they had obtained 3062 new consumers, against an increase in the previous year of 2757; and the sale of appliances had increased by 18,597, also slightly more than a year ago. It was interesting to know the demand they had to meet in Croydon. On Dec. 4, in the very cold weather, the maximum day's output was 11,324,000 c.ft., an increase over the corresponding day of the previous year of 37½ p.ct. This record, however, was broken on Jan. 16, when the increase on the day was over 36 p.ct., and for the week there was an increase of 22 p.ct. They could not be surprised, in these circumstances, at capital expenditure, mainly in connection with a new retort house, additional purifying plant, and preliminary payments in regard to the new showrooms at Purley. There was also a very substantial outlay on mains; and during the current year the Directors contemplated the spending of a considerable sum on new trunk mains. The people of Croydon believed in their local undertakings. During the year £179,000 of capital had been raised, mostly from those living in the district and from the Company's employees. Having regard to the growth of the business, further capital would be necessary. On the revenue account residuals showed very disappointing results; but this was universal. The decrease in price represented as much as 4d. per 1000 c.ft., while the net price of coal was nearly 3d. more. In these circumstances, the Directors felt justified in increasing the price of gas from 8·8d. to 9·8d. a therm. This was not operative throughout the whole year. Showroom sales had gone on well, and totalled over £55,000. The increase in the number of cookers, fires, and geysers came to some 10,500, and fittings over 5600. More than 105,000 orders from customers were dealt with. In the year which was now beginning they would received some advantage from a reduction in the price of coal; and this would go some way to offset the low price received for residuals. As to the Government electricity proposals, he was confident that the Company need not view the future with apprehension. Referring to the Widows, Orphans, and Old-Age Contributory Pensions Act, he was able to say that the Company had been in advance of the State, having in 1917 started a contributory pension scheme for the co-partners, and in 1922 added provision for widows and orphans, to which the men contributed, and linked-up the staff superannuation fund. This fund amounted to about £113,000, and had nearly 900 members. The new Act brought an additional charge on the Company and on the workers. The two schemes overlapped. The Company's scheme was guaranteed; and they felt it would be unfair to make any alteration that might be said to break the bargain. They had, however, decided to make certain alterations, which he outlined. The employees had voluntarily accepted a new reduction of 1d. a week for the hospital fund, which would bring in £210 a year, to be allocated to the hospitals in Croydon and neighbourhood.

Mr. T. RIGBY seconded the adoption of the report and accounts; and they were passed.

On the proposition of the CHAIRMAN, seconded by Mr. H. WOODALL, the payment of the following dividends was approved: Preference stock, 7½ p.ct.; sliding-scale stock, 6½ p.ct.; maximum dividend stock, 5 p.ct. Mr. Woodall remarked that in spite of a progressive electricity department the Company's business showed a very fine and continuing increase. They had one of the best distributing systems in the country.

Messrs. T. Rigby (who has been on the Board for 35 years) and H. Woodall were re-elected Directors.

Thanks to the staff and workmen were acknowledged by Messrs. A. CADDICK (Engineer and Works Manager), W. J. SANDEMAN (Distribution and Sales Manager), and Mr. W. W. TOPLEY (Secretary).

Gas at Tunbridge Wells.—Gas was well to the fore at the Ideal Homes Exhibition held from Feb. 15 to 20, at the Corn Exchange, Tunbridge Wells. So skilfully had Mr. C. F. Catt and the staff of the Tunbridge Wells Gas Company contrived matters, that it was hardly possible for a visitor to the exhibition to lose sight of some propaganda dealing with gas. The entrance hall was adorned with posters displaying the advantages of gas for lighting, heating, cooking, and power, as also was the corridor connecting the two main halls, while in the tea room a Main "Cinderella" fire was constantly in operation. The Gas Company's exhibit, situated in the first hall, was admirably arranged. The gas fires, cookers, pendants, brackets, and other appliances and fittings were well displayed. The lighting effect was excellent. In the other hall, an exhibit of Messrs. R. & A. Main's "Conservor" cookers attracted considerable attention. Visitors were greatly interested in this latest improvement in gas ovens, and fully appreciated the saving in gas and improvement in cooking effected by the "Conservor." Altogether, the gas section of the exhibition was a great success; and Mr. Catt and his staff are to be congratulated on the progressive policy so well carried out by them.

BARNET DISTRICT GAS AND WATER COMPANY.

A Growing Business.

The Ordinary Half-Yearly General Meeting of the Company was held on Monday, Feb. 22, at the Cannon Street Hotel, E.C.—Mr. WILLIAM CASH, F.C.A., presiding.

The SECRETARY (Mr. E. D. Davey) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said reference was made in the report to the growth of the business, which was entirely satisfactory. Sales of gas showed an increase in quantity, by comparison with 1924, of 11·8 p.ct., due, of course, in some measure to the weather in the latter part of the period. As regarded water, the money receipts had considerably gone up (by 8·8 p.ct.); while the quantity of water supplied to the consumers had increased to an even greater extent (by 11·9 p.ct.). Turning to the accounts, and dealing first with gas, the capital expenditure during the half-year to Dec. 31 had been chiefly in connection with mains and services and new meters; and the total expenditure came now to £164,938, which was, in relation to the gas they were now selling, a satisfactory figure of about £540 per million c.ft. The outlay in the six months other than on mains, &c., was in connection with a cottage purchased and some more pressure-raising plant. The price of gas in the corresponding half of 1924 was 11d. per therm in the first quarter, and 10¼d. in the second quarter; whereas throughout the period now under review it was 10¼d. per therm. The accounts were disappointing in a sense, inasmuch as there was a considerable drop in the final balance of profit; but this was very easily accounted for. With other gas undertakings, they had suffered severely from the fall in the price of residuals, which, of course, the Board could not control. For sulphate of ammonia the returns had been the lowest for a great many years; while for coke the price realized was some 3s. 8d. per ton less than in the corresponding half of 1924. The result was that, while coal had cost almost exactly the same per ton as a year ago, and while the coke supplied to their own department for carburetted water gas was slightly less, the net price of coal came out at 3¾d. per 1000 c.ft. more, which accounted for some £2400 of the decreased profit. The reduction in price of gas accounted for another £600. These two items accounted for £3000; while the drop in profits was £2840. There they had the position "in a nutshell." Rates and taxes had gone up £250; while, on the other hand, the growth in the business had, of course, helped them. As to the current half-year, while there was no improvement visible at the moment in respect to residuals, there would be some small benefit accruing from the slight reduction in the price of coal. Coming to the water side of the business, the expenditure on capital account again related, so far as buildings were concerned, to some cottages they were erecting for their workpeople; and the remainder was for mains and services. The revenue account was satisfactory, as he had already pointed out. There was an additional profit on revenue account of £2409. Pumping had cost £756 more, consequent upon the larger quantity of water raised; and rates and taxes were up £162.

In the profit and loss account, the results of both departments were brought together. Income-tax required less on this occasion than it had been necessary to provide in preceding half-years. A sum of £2500 had been transferred to the water contingency fund account; and on the half-year they had earned their maximum dividends, with a surplus of £579. The surplus on the whole year (they did not quite earn their dividends in the first half) was £335. Reference was made in the report to the fact that the Directors had let contracts for enlarging the gas manufacturing plant. The proprietors would not be surprised to learn this, when he told them that in 1925 the sales of gas were 296 millions; in 1924, 274 millions; and in 1919 (to get a five-year period), 215 millions. This contract for enlarging the gas plant amounted to about £40,000; but it was, of course, obvious that from time to time they must provide for a growth in the business of the character he had indicated in connection with the supply of gas. No doubt, the proprietors would expect a few words from him with regard to the Government proposals in relation to the electrical industry. What the gas industry asked for was fair and equal treatment, so that whatever was done for the electrical industry should be done similarly for the gas industry. If gas secured this fair treatment, he believed there was plenty of room for both. The National Gas Council were closely watching the matter, and had submitted certain representations to the Minister in charge of the Bill.

With the growth of water consumption to which he had made reference, the time had arrived when it was essential that application should be made to Parliament for further water powers. The Company were last in Parliament in 1904; and since then they had constructed and brought into use fresh pumping stations which unfortunately, though numerous in number, were not equal to the demand which would be made upon them in the comparatively near future. It was essential for all water undertakings to look some distance ahead, because so much time was required to secure additional supplies. They proposed by the Bill to include in their water area the district in which they desired to sink the new well or wells; so that there would be no opportunity for raising the objection that the Company were taking from Hertfordshire water which was required there. The expenditure to be incurred would be considerable; and, of course, they would ask for power to make adequate charges—with provision for revision three years after the passing of the Bill. It was essential, to enable them to raise the capital which would be necessary to carry out the scheme, that this capital should be assured of a certain and regular dividend; and it would be obviously unwise for their charges to be cut down so that the dividend would be insecure. There had been inserted in the Bill provision for the acquisition by agreement of the Hatfield Water-Works; and in all probability this would be carried into effect.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) seconded the adoption of the report and accounts, which was unanimously agreed to.

On the proposition of the CHAIRMAN, seconded by Mr. COLIN DOCWRA, dividends were declared, less income-tax, for the half-year to Dec. 31, at the rates per annum of 10 p.ct. per annum on the "A," "B," and "C" stocks, and 7 p.ct. per annum on the "D" capital gas and water stocks.

The retiring Directors (Mr. Colin Docwra and Mr. Samuel Cutler) and the retiring Auditor (Mr. B. D. Holroyd) were re-elected.

Moved by the CHAIRMAN, and seconded by Mr. WILLIAM RICHARDS, a hearty vote of thanks was accorded the officers, staff, and workmen for their services to the Company during the past half-year.

To this, Mr. J. F. HASELDINE (the Engineer and Manager) and Mr. DAVEY responded.

ISSUE OF DEBENTURE STOCK.

An Extraordinary General Meeting followed at which a resolution was passed enabling the Directors to exercise the remaining borrowing powers of the Company—namely, £26,250—by the issue of 5 p.ct. consolidated debenture stock in lieu of the 4 p.ct. consolidated debenture stock previously authorized.

THE BILL APPROVED.

Thereafter there was held a Wharncliffe Meeting, to consider the Bill now pending in Parliament, and, if thought fit, to approve it.

The CHAIRMAN went through the ninety odd clauses of the Bill, and explained the various points. In addition to the matters mentioned above, he said there were provisions for consolidating the five stocks into one stock entitled to a maximum dividend of 7 p.ct. The amounts of new stock allotted to the various classes of holders would be such that all proprietors would get precisely the same dividend as they enjoyed to-day. The one new stock would be more marketable than the present several kinds. He moved that the Bill be approved.

The DEPUTY-CHAIRMAN seconded the motion.

There was some discussion, in which the question of back-dividends mainly figured; but the CHAIRMAN expressed the view that, taking all matters into consideration, if they had put forward any scheme including back-dividends they would have met with opposition.

The resolution was carried; and afterwards it was passed, *nem. con.*, at separate meetings of the different classes of stockholders.

A vote of thanks to the Chairman and Directors, on the proposition of Mr. H. F. PARDY, terminated the proceedings.

GAS EXHIBITION AT SMETHWICK.

The Smethwick Gas Committee are to be congratulated on the enterprise manifested in organizing an excellent exhibition, which was opened on Monday, Feb. 22, and concluded on Feb. 27.

Alderman PINKNEY, Chairman of the Gas Committee, presided at the opening ceremony. He said that the lay-out of the exhibition was due to the Engineer, Mr. E. Hardiker, but it would be unfair if no praise was offered to the workmen under the able guidance of Mr. B. Skidmore.

Miss HILL, the chief lady official at the gas showrooms, asked the Mayoress to accept a bouquet of carnations—the gift of the Gas Committee.

The MAYORESS (Mrs. F. H. Jones) said what pleasure it gave her to be with them. The object of the exhibition was to demonstrate what gas could do to help the housewife. At every stage of life gas had its uses. It was difficult to mention any operation of a domestic nature in which gas could not be of practical assistance. By using gas appliances they could have an ever-ready hot water supply, and do away with smoky grates, the laying of fires, and the taking away of ashes. Gas supplied them with a clean labour-saving method of keeping the house in order—and, what was most attractive, at very small cost. Gas was delivered to the very point at which it was required, and needed no effort beyond the turning-on of the tap. The smoke nuisance had been claiming the attention of the women of the town, and the Mayoress suggested that by using gas—a smokeless fuel—a great deal of the trouble would be abolished, for the domestic chimney produced more than one-half of the smoke which polluted the atmosphere.

Mr. J. E. DAVISON, M.P., remarked that few people in the country realized the importance of the gas industry, and its beneficial effect on the commercial and domestic life of the nation.

Mr. W. M. MASON, Manager of the British Commercial Gas Association, who was given a cordial introduction by Alderman Pinkney, said he was delighted that Mr. Davison was so interested in their work. It was the national point of view that they tried to work into these exhibitions. The solution to the smoke problem was to be found in the extended use of gas. In the Central London area, gas appliances had increased from about 700,000 in 1912 to about 1½ millions in 1924. During this period the annual soot-fall had dropped from 76,000 to 35,000 tons. This would give them some idea of the tremendous public service the gas industry was rendering.

Mr. R. J. ROGERS (Birmingham Gas Department) remarked that it must be of great value to the Borough of Smethwick that the Gas Committee was presided over by a gentleman of such technical attainments as Alderman Pinkney.

Alderman PINKNEY acknowledged the tribute, and in doing so referred to the scheme for cookery demonstrations by Miss Sanderson, and also to an essay competition among the school children. The children had made a tour of the gas-works, and there were prizes for the winning essays.

GAS COMPANIES' RESULTS IN 1925.

Alnwick.

The annual general meeting of the Company was held on Feb. 25—County Councillor A. T. Robertson, J.P., presiding. Increased gas sales over the previous year, constituting a fresh record, were reported, and also an increase in the number of cookers, fires, water heaters, and wash boilers fixed. Final dividends were declared making totals for the year of 12½ p.ct. on the original stock, 9½ p.ct. on the additional stock, and 6 p.ct. on the preference stock.

Bristol.

At the general meeting of the Company, Sir George E. Davies (Deputy-Chairman), who presided in the absence, through ill-health, of Mr. J. H. Howell (Chairman), referred to the continued expansion of their business. The amount received for sales of gas—£556,269—was an increase of over £40,000 on the previous year. This satisfactory result, he said, was due mainly to the increased use of gas for cooking and heating. The gas made in 1925 amounted to 3905 million c.ft. Statisties showed that the consumption of gas in the city during the last 25 years had nearly doubled. In 1900 the cookers on hire totalled 13,095. To-day the figure was 71,103. Mr. William Windus proposed that a dividend for the half-year ended Dec. 31 last at the rate of 5 p.ct. per annum be declared. This was seconded by Sir Percy Stothert, and adopted.

East Grinstead.

After payment of the interim dividend, interest on debentures, and other fixed charges, the profit and loss account shows a balance of £9160 available for dividends, from which the Directors, at the annual meeting on Feb. 25, recommended payment for the half-year ended Dec. 31 last of 5 p.ct. on the original "A" stock and "A" shares, and of 3½ p.ct. on the "B" and "C" shares (less income-tax), which makes 10 p.ct. and 7 p.ct. respectively for the year. There remains to be carried forward £6649. The Chairman, Mr. W. H. Hills, in moving the adoption of the report and balance-sheet and the declaration of the dividends, said that the manufacture of gas cost them £800 less than in the previous year, notwithstanding the fact that they made nearly 2 million c.ft. more than in 1924. Sales of gas to the public increased by 4¼ million c.ft. While in 1924 the amount of unaccounted-for gas was 8 p.ct., this was reduced to 4 p.ct. in 1925. Sales of gas resulted in an increased income of £560, but residual products brought in £1600 less. Mr. J. Donaldson, in seconding, said that the results were highly satisfactory. Their capital was only £493 per million c.ft. produced per annum.

Hastings and St. Leonards.

The sale of gas for the half-year ended Dec. 31 last shows an increase of 7·8 p.ct. The Directors recommend payment of the following dividends (less income-tax) for the half-year: On the 5 p.ct. converted stock, £6 15s. p.ct.; on the 3½ p.ct. converted stock, £5 5s. p.ct.; and on the 5 p.ct. additional stock, £6 4s. p.ct. per annum.

Matlock.

The Directors of the Matlock and District Gas Company report that the profit for 1925 amounts to £5283. The dividend recommended for the year totals 10s. 4½d. per share; and there is carried forward the sum of £10,379, as against £8778 a year ago.

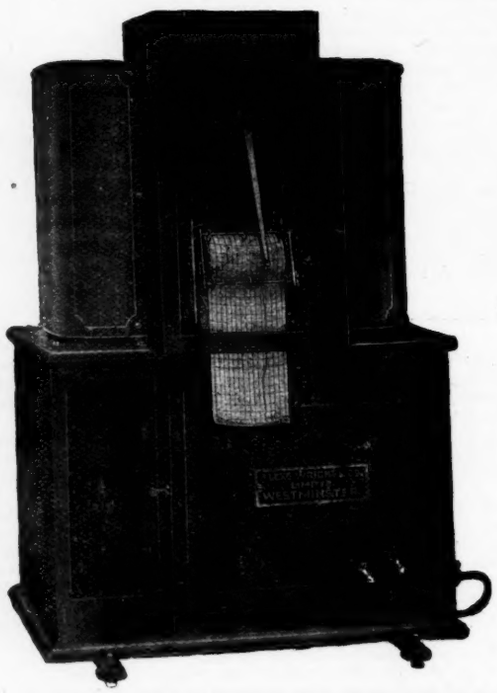
Newcastle.

Moving the adoption of the report and accounts at the annual meeting of the Newcastle-upon-Tyne and Gateshead Gas Company, Mr. J. E. Cowen, Chairman, said that coal and oil cost £62,700 less than in the previous year, notwithstanding a larger sale of gas. Distribution items were greater by £9000. due to more work being done for the consumer and to a greater amount of repairs and renewal of pipes. Receipts from gas and rental of appliances showed an increase of £44,000, but the net receipts from residuals were down by £97,000. Referring to the Government electricity scheme, Mr. Cowen said it must be remembered that in their district they had had the super-power station with them for a good many years. Yet last year they had an increased sale of gas of 5⅜ p.ct., on the top of an increase of 4⅜ p.ct. in the previous year; and on Dec. 31 last there were 18,000 more gas appliances in use in their district than at the end of 1924. Last year they had, in addition, supplied about 16,000 lighting fittings, exclusive of burners. He doubted whether people realized the great progress that had been made. When the industrial depression which existed in their district was taken into consideration, these were excellent figures. He considered them most encouraging; and they had every reason to believe that they would go on increasing them. With the exception of one housing scheme, they were supplying gas to practically every new house in their area. They were improving the street lighting organization. Grey Street was now one of the best-lighted thoroughfares in the country. In their area there were 100,000 gas cookers and about 50,000 gas fires; and 97 p.ct. of the doctors in their district used gas fires. The Chairman moved that final dividends be paid at the following rates: On the preference stock 2 p.ct., making 4 p.ct. for the year; on the additional preference stock £1 6s. 8d. p.ct.; and on the ordinary stock, 2½ p.ct., making 5 p.ct. for the year. This was seconded by Lieut.-Col. Ritson, and carried unanimously.

Portsea Island.

At the half-yearly meeting of the Portsea Island Gaslight Company, the Chairman, Mr. T. H. F. Lapthorn, J.P., stated that the capital expenditure had amounted during the six months to £45,191, the bulk of which had been for new retorts and additional purifiers at Hilsea. The total cost of the retorts was £51,107, of which only £6593 remained unpaid; and of the holder, £34,081, the whole of which had been paid. These additions had increased their manufacturing capacity by 21 p.ct. and their storage capacity by 33⅓ p.ct.

THE CALORGRAPH



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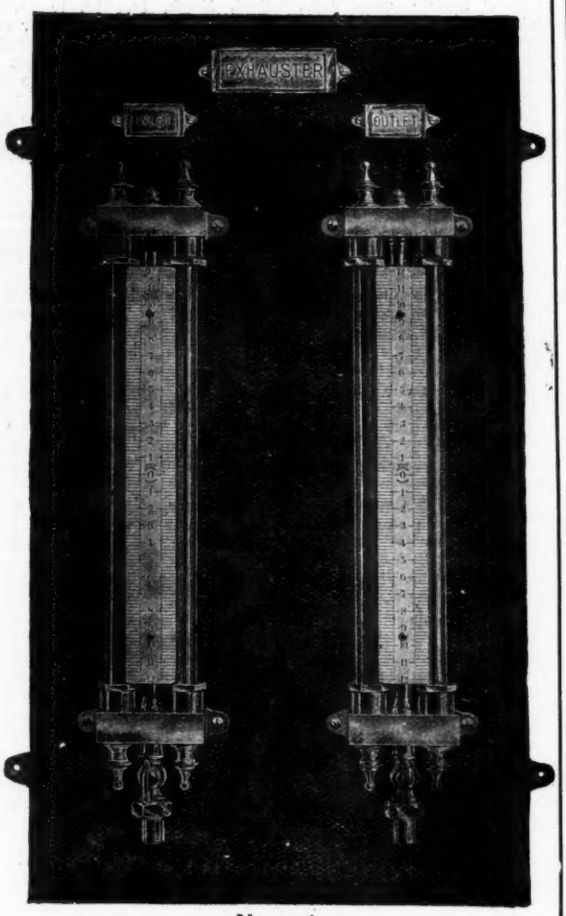

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They had overspent their capital to the extent of £172,787, which, with the exception of about £15,000, had been borrowed from the bank. As soon as the money market was considered sufficiently favourable, new capital would be issued to repay that indebtedness. The receipts from the sale of gas were £1524 more than in the corresponding six months of 1924, although the price per therm had been reduced by 2-tenths of a penny to ordinary consumers and by 3-tenths of a penny to prepayment consumers. The yield from residuals, however, was only £44,000, compared with £65,000 in 1924. Quality and pressure had been well maintained, but they were not entirely satisfied with the pressure in the south-east portion of the borough, due to its being a long distance from the works; and an order had been given for a new 24-in. main. He might say that, since Jan. 1, gas sales had shown an increase of 7 or 8 p.ct. over the first few weeks of 1925, and cookers in use had increased in number by 1683 and gas fires by 2564. Five years ago, they had 35,271 hired cookers installed; to-day they had 42,493—an increase of over 20 p.ct. They had then 3194 hired fires in use, and to-day there were 20,125—an increase of over 530 p.ct. The profit on the half-year amounted to £32,075, or £1330 more than that of a year ago. The available balance was £63,072, of which the dividends would take £20,290, leaving them with £42,782 with which to start the half-year, or £250 more than six months ago. Dividends for the half-year ended Dec. 31, at the following rates per annum, were recommended: On the "A" and "B" shares, 14 p.ct.; on the "C" shares, 13 p.ct.; on the "D" and "E" shares, 11 p.ct.; and on the 5 p.ct. maximum stock, 5 p.ct., all less income-tax. To their two pension funds the Company had contributed during 1925 the sum of £3593; and the pensions paid during the same period amounted to £1788, of which about half was paid out of the general revenue of the Company. Their pensioners now numbered 46. The report and accounts were adopted. A sum of £100 was donated to the Royal Portsmouth Hospital.

Rochester, Chatham, and Gillingham.

In moving the adoption of the report and balance-sheet at the annual meeting on Feb. 19, the Chairman, Alderman E. H. Willis, said that the revenue from sales of gas, which showed an increase of 27 million c.ft., had exceeded that of 1924 by £2254. During the year, £5573, had been expended on mains, and £6894 on the carbonizing plant at Rochester. The revenue account showed that coal, oil, &c., cost £5728 less than in 1924. The other items were approximately the same, and the total expenditure was down by £6049. Rental of meters, stoves, and fittings was in excess by £1066, but residuals showed a decrease of £10,613. Alderman Willis added that the Company employed over 350 men, who received in wages last year £52,966. Mr. E. H. Elliot, Vice-Chairman, proposed the declaration of a dividend at the rate of 6 p.ct. per annum (less income-tax) on the consolidated ordinary stock.

Rossendale Union.

The half-yearly report of the Rossendale Union Gas Company shows a profit of £5246, against £5103 for the corresponding period of the previous year. After contributing £298 to reserve, there is an available balance of £5506, out of which the Directors recommend statutory dividends on several classes of shares, absorbing £4594, and leaving £912 to be carried forward.

Shanklin.

A dividend for the year 1925 at the rate of 7½ p.ct., less income-tax, was declared at the annual meeting of the Shanklin Gas Company. The accounts showed a balance of £8723 standing to the credit of the profit and loss account, subject to the payment of the dividend. A substantial increase in the sale of gas was reported. The showroom, workshops, &c., at Wroxall have now been completed, and are proving a valuable addition to the Company's resources. A contract has been placed for a new three-lift spiral guided gasholder and steel tank, to be ready for use in the coming summer.

South Shields.

Moving the adoption of the annual report at the meeting of the Company on Feb. 23, Sir J. Readhead, Bart., Chairman, said that during the year the capital account had been increased by £600. The revenue account showed an income of £164,640 and an expenditure of £142,717, leaving a profit of £21,922 on the year's working. Considering the acute trade depression in the area of supply, he was sure they would agree that the fact of being able to hold their own during the period under review was satisfactory and encouraging. The decrease in the income from coke amounted to £10,783, while tar brought in £3235 less. The reduction in the income from sulphate of ammonia was £1087. Fortunately this large decrease in income was more than counterbalanced by decreases in expenditure. Coal, oil, &c., showed a reduction of £22,371. Mr. T. W. Wallis, Vice-Chairman, seconded, and the report was adopted. Colonel Dawson moved a resolution that a dividend be declared on the consolidated and the new stocks at the rate of 4½ p.ct., less income-tax, for the half-year ended Dec. 31 last, making 8½ p.ct. for the year; also that a dividend of 2¾ p.ct., less income-tax, be declared on the ordinary stocks, making 5¾ p.ct. for the year. Mr. Henry Chapman seconded.

Sunderland.

Alderman W. F. Vint (the Chairman), speaking at the annual meeting, said the Gas Company and the Corporation Electricity Department were pleasant rivals. He did not think any shareholder need be alarmed about the Government's electricity proposals, for in Sunderland the Electricity Department had got their price so low that he did not believe the Government schemes could do any better. Compared with pre-war days, there had been an increase of 40 p.ct. in the amount of gas made. It was a cause for congratulation that the price of gas in Sunderland remained the same, and was one of the lowest in the country. The total expenditure of £219,420 was £27,912 less than in the previous year, and sales of gas realized £4105 more; but against these items there was a serious fall in the price of residuals—coke bringing them in £22,811 less than in the previous year. A dividend was declared of 3 p.ct. on the ordinary stock, less income-tax, for the six months ended Dec. 31.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Extremely dull conditions have prevailed in this market throughout the past week, and it cannot be described as anything except lifeless. There appears to be no demand for any class of coal, and prices naturally continue to fall. There is no doubt that they went ahead too rapidly earlier in the year, owing to the stocking policy adopted by many buyers. Such requirements are no doubt to some extent satisfied, and, moreover, the impression has been growing in recent weeks that a stoppage will be avoided. The report of the Commission is expected this week, and it may be that it will give a fillip to the market one way or the other. In the meantime there is nothing doing, and the keen competition for the few orders which come along is rapidly depressing prices.

Gas coals have been much in discussion for July to June contracts; and, while some collieries are said to have been willing to risk a bit in the price, and go on for a year ahead, others prefer to await any indications of the industry's future that may be forthcoming.

Current quotations are 19s. for Wear Specials, and 17s. 6d. to 18s. for best qualities. Seconds are offering freely at 15s. Durham unscreened coking is very weak, and 14s. 6d. to 15s. is quoted, though only best makes can hold for these prices. Unscreened bunkers are also in poor demand, and best makes are down to about 15s. 3d.

The coke market is idle and weak, and gas makes quote 22s. to 23s. 6d., with patent foundry 18s. to 20s. f.o.b.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The mild weather has led to a falling-off in the demand for house coal from Yorkshire and Lancashire, and prices for some of the lower-grade fuels have decreased, particularly in the Metropolitan area, where the market at the moment is dull. Collieries generally, however, are working full time, although there may be some slight modification in the near future if the present conditions continue.

The industrial outlook does not improve, and it appears that large consumers are compelled to wait for the report of the Coal Commission before deciding on their future policy. It is reported that the iron and steel trades are slightly better than they were some months ago; but the increase is so small as to have no apparent effect on the market. On the other hand, the clothing trade appears to go from bad to worse; the decreases being most marked in the exported manufactured goods.

Gas coals under contract are moving steadily, with indications that the consumers have sufficient in stock for any eventualities. Whether the policy of making contracts twelve or eighteen months ahead is a good one or not is questionable, in view of the general uncertainty of the coal trade.

The export section continues very quiet, and orders from abroad are difficult to obtain for most descriptions of fuel. Only 11,000 tons were shipped in the Humber last week.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 20s. 6d. to 20s. 9d.; screened gas, 20s.; washed doubles, 20s.; washed singles, 18s.; rough slack, 9s. 6d.; smithy peas, 19s. to 20s. 6d.. West Yorkshire—Hartleys, (f.o.b. Goole), 17s. 9d. to 18s. 9d.; washed doubles, 18s.; washed singles, 17s. to 17s. 6d.; washed smalls, 12s. 3d.; unwashed trebles, 17s. 6d.; unwashed doubles, 14s.; rough slack, 10s.; coking smalls, 9s. 9d. to 10s. Derbyshire and Nottinghamshire—Top hards, 21s. 6d. to 22s. 6d.; washed smalls, 10s.; rough slack, 9s. 9d. to 10s. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 18s. to 19s.; gas coke, 23s. to 24s.; furnace coke, 17s. 6d.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

Progress is being made with the arrangement of contracts for gas coal over the year beginning July next. A few undertakings have come to terms with collieries; the prices agreed being 1s. to 1s. 6d. below those which have ruled in the year now approaching its final quarter.

The seasonal reductions in pit-head prices of household coals are taking effect earlier than usual this year. There has been a very pronounced falling-off of demand. This helps to correct the unbalancing which has been apparent of late in regard to smalls and slacks. With a reduced production of house coal, the tendency of those categories to exceed consumptive needs will be modified. Nevertheless, prices of smalls and slacks are on the weak side; indeed, spot lots of almost any description of coal have been obtainable at appreciably less than the rates that nominally rule. Although collieries are willing to make concessions rather than allow obstructive stocks to accumulate, consumers' reserves are believed to be small, and this has some steadying effect on the market.

Some of the gas-works are supplementing their contract quota. Electricity stations are also taking supplies freely. Private industrial concerns do not seem to regard the critical position in the coalfields as a reason for laying-down stocks.

TRADE NOTES.

New Coke Cutting Machinery.

Messrs. Pertwee & Back, Nelson Iron Works, Great Yarmouth, who for many years have specialized in ice crushing machinery, are using their knowledge in the manufacture of plant for coke cutting. Experiments carried out on coke cutting in connection with a large grading plant showed that the percentage of dust formed when using one of Pertwee & Back's machines amounted to only 4 p.c.—a remarkably good result.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *March* 1.

The advance in the price of pitch continues, and it is reported that business is possible at about 80s. per ton for this season's shipment. There is also considerable inquiry for October-December shipment, for which period the price is about 75s. to 77s. 6d. per ton.

Creosote continues steady at 7⅛d. to 7¼d. per gallon net and naked at makers' works.

The rise in the price of petrol has caused a stiffening in the prices of tar spirits. Pure benzole and pure toluole are steady at about 2s. 2d. per gallon, and 95/160 solvent naphtha is about 1s. 10d. per gallon.

Pyridine is in demand at about 20s. per gallon.

Tar Products in the Provinces.

March 1.

There has been a further rise in the market for pitch during the past week, owing to the further buying from the Continent, and a fair amount of business has been transacted for this and next season.

The market for other tar products remains about the same.

The average values for gas-works products during the week were: Gas-works tar, 51s. 9d. to 56s. 9d. Pitch, East Coast, 77s. to 78s. f.o.b. West Coast—Manchester, 71s. 6d. to 72s. 6d.; Liverpool 72s. to 73s.; Clyde, 75s. to 76s. Benzole, 90 p.ct. North, 1s. 8½d. to 1s. 9½d.; crude, 65 p.ct., at 120° C., is 1s. 1d. to 1s. 2d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 8½d. to 1s. 9½d. Toluole, naked, North, 1s. 8d. to 1s. 9d., nominal. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 11½d. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 6d. to 6⅛d.; Scotland, 5¾d. to 6d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Price of Gas at Devonport.—The Plymouth Corporation Gas Committee have decided to recommend the Council to reduce the price of gas from 2s. 7d. to 2s. 6d. per 1000 c.ft. to ordinary consumers, with corresponding reductions in the charges to other classes.

Sunlight League.—The first general meeting of Vice-Presidents, members, and supporters will be held on Tuesday, March 9, at 3 o'clock, at Hampden House, 61, Green Street, W. Among the speakers will be the Duke of Sutherland (President of the League) and Dr. Saleeby, F.R.S.E. (Chairman).

Gas Preferred at Blyth.—The question of lighting fifty houses adjacent to Twelfth Avenue, Blyth, was decided at a recent meeting of the Lighting and Water Committee. The former decision to have electricity laid on to the houses was negatived, and the meeting decided in favour of gas. The street lighting, it was also agreed, should be gas.

Redhill Gas Company.—At a recent sale, £1705 6 p.ct. cumulative preference stock of the Company was sold in lots of £100 generally; the whole aggregating £1699 (£99 13s. p.ct.). An amount of £430 of "B" ordinary stock (paying 5½ p.ct.) sold for £396 (£92 18s. p.ct.). This, it is interesting to note, is the highest price obtained since the war.

The Devonport Gas Affair.—The Plymouth Corporation have now received from the Public Prosecutor the papers relating to the alleged irregularities in their Devonport gas undertaking, as a result of which the Engineer resigned recently and the Chief Clerk was dismissed. The Corporation, at the special meeting which dealt with the affair, declined to pass a resolution ordering an immediate prosecution, resolving instead to refer the matter to the Public Prosecutor for his decision upon it. The latter, in returning the papers, has indicated a course of action, but has left the responsibility for pursuing it to the Corporation, who, in the event of proceedings, would be the prosecutors. A decision on the point will have to be made at the meeting of the Town Council next week.

The sale of gas at Lytham-St. Annes last year showed an increase of 14·2 p.ct. over the previous twelve months.

Consequent upon flooding of the workings, the Silkstone Main Colliery has ceased operations. The effect of the stoppage is serious, for over 200 men are thrown out of employment. Restarting of the mine is at present out of the question.

The Gas Committee of the Buxton Corporation, with the object of advertising the town, have given instructions to the Gas Engineer (Mr. F. G. Shaw) to have the words "Buxton Mountain Spa" painted on the railway wagons which have been purchased to bring coal to the gas-works.

At a recent meeting of the Blackburn Town Council, the Gas Committee's recommendation that a request of the Manchester Regional Joint Industrial Gas Council that notices be posted at the gas-works regarding the organization of employers and employees should be agreed to, was referred back. After further discussion at a meeting of the Gas Committee, on Feb. 22, it was decided again to recommend the Council to authorize the posting of the notices.

Speaking at the annual meeting of Preston Chamber of Commerce, Mr. S. Tagg, J.P. (the Gas Company's Engineer) said that if the new Electricity Bill achieved its aim in providing an ample and cheaper supply for industry, it would receive general support. It might be assumed by some that the proposals would be injurious to the industry with which he was associated; but this was a view he did not share. He believed there was no reason why the two industries should not continue to develop on different, if parallel, lines.

STOCK MARKET REPORT.

MANY complaints were heard from brokers last week of the lack of business. Looking at the matter from their own point of view, they seem to expect that investors in Rubber shares should cut the losses which have been brought about in the values by the fall in the price of the commodity. Apparently investors, and dealers also, have confidence in the future, and are holding on to their commitments, with the result that the money is not available for fresh dealings.

All the more important gas companies have now issued their accounts; and as we anticipated some few months ago, the results are uniformly satisfactory. Wherever reductions in the rates of dividend have been made, it is felt that they are due to the too premature revision of the standard price, which it is hoped will soon be remedied. At the meetings which have been held, most of the Chairmen, it is noted, were very optimistic of the future prospects. The Chester, Hastings, Southampton, and Tynemouth Companies have announced dividends at the same rates as for the corresponding half-year of 1924. Brighton have dropped 10s. p.ct. per annum on both the Original and "A" stocks, and the North Middlesex 10s. p.ct. per annum on the 10 p.ct. stock, and 7s. p.ct. per annum on the 7 p.ct. stock. In view of the inquiry into the question of the standard price held on Monday of this week, it is interesting to note that the South Suburban 5 p.ct. stock advanced ½ point. Gas Light ordinary dropped a further ¼ point *ex* div.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 26.	Rise or Fall.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Feb. 4	5	5	Aldershot 5 p.c. max. C.	74—77	..	75—76
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—74	..	..
1,551,868	,,	Oct. 8	6½	6½	Alliance & Dublin Ord.	69—73	..	69½—70⅝
374,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	58—63	..	58½
300,000	1	Oct. 22	1/7½	1/7½	Bombay, Ltd.	⅞—1	..	18/9
170,000	10	Aug. 13	8½	8½	Bournemouth 5 p.c.	12—13	..	..
425,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	12⅝
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	..
50,000	Stk.	Jan. 7	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
214,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	172—177	..	..
244,200	,,	,,	9½	9	Do. A Ord.	137—142	..	..
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91*a*	..	..
855,000	,,	Oct. 8	7	8	British Ord.	103—108	..	103½
100,000	,,	Jan. 7	7	7	Do. 7 p.c. Pref.	117—122	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—74	..	..
100,000	10	Dec. 17	8	6	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Nov. 5	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Jan. 7	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,860	,,	Feb. 18	6	6	Cardiff Con. Ord.	96—99*	..	..
237,860	,,	Jan. 7	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	..	..
157,150	,,	Aug. 13	6½	5	Chester 5 p.c. Ord.	90—95*b*	..	..
79,185	1	Oct. 8	—	2/-	Colombo Ltd. Ord.	25/—27/-	..	..
24,500	1	,,	—	1/4½	Do. 7 p.c. Pref.	21/—23/-	..	..
1,513,280	Stk.	July 23	5/14.8	5½	Commercial 4 p.c. Cap.	80—85	..	82
560,000	,,	,,	5⅜	5/3/4	Do. 3½ p.c. Cap.	80—85	..	..
475,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	55—58	..	56½
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	33—38	..	33—34½
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	88—91	..	..
737,150	,,	Aug. 13	6½	6½	Croydon sliding scale	97—101	..	..
403,100	,,	,,	5	5	Do. max. div.	81—84	..	..
492,270	,,	Aug. 13	9	6	Derby Con.	109—111*c*	..	..
55,000	,,	Dec. 17	4	4	Do. Deb.	74—76*c*	..	..
209,000	,,	Sept. 10	5	5	East Hull Ord. 5 p.c.	88—91	..	..
50,000	,,	Dec. 17	—	5	Eastbourne 5 p.c. Deb.	93—98	..	..
1,002,180	10	July 23	4	6	European, Ltd.	5⅞—6⅞	..	6
16,413,285	Stk.	Feb. 18	5½	4/17/4	Gas Light & Coke 4 p.c. Ord.	78½—80½*	−½	78½—80
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	58—61*	..	58½—59½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	75—78*	..	75—77
4,761,930	,,	Dec. 17	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58¼—59½
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb	..	..	..
82,500	,,	Sept. 10	6½	6½	Hastings & St L. 5 p.c. Conv	90—95	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	19½—20½	..	20½
86,500	Stk.	Aug. 13	10	10	Hornsey 7 p.c.	132—137	..	133—133
1,976,000	,,	Nov. 19	69	10	Imperial Continental Cap.	135—140	..	136½—138½
226,170	,,	Feb. 4	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	69½—70
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	99—99½
2,127,340	,,	Feb. 18	5⅝	5⅝	Liverpool 5 p.c. Ord.	81⅝—82½*b**	..	..
600,000	,,	Sept. 24	7	7	Do. 7 p.c. Red. Pref.	103—105*b*	..	..
165,736	,,	Feb. 18	9	8	Maidstone 5 p.c. Cap.	115—120*	..	..
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 3	7	6	Malta & Mediterranean	4½—5	..	4⅝—5
541,920	Stk.	Nov. 19	4	4	Montevideo, Ltd.	69—73	..	71¼—72
2,061,315	,,	Aug. 13	5	5	Newcastle & Gateshead Con.	74⅜—75½*d*	..	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	76½—77½*d*	..	..
529,705	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb.	70—72*d*	..	..
15,000	,,	Aug. 27	12	11½	North Middlesex 10 p.c.	160—170	..	..
91,530	,,	,,	8⅝	8⅝	Do. 7 p.c.	115—120	..	..
300,000	Stk.	Dec. 3	7	9	Oriental, Ltd.	98—103	..	..
188,120	,,	Jan. 7	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	110—115	..	..
60,000	50	Aug. 27	14	14	Portsea Island B	93—96	..	..
100,000	50	,,	13	13	Do. C	90—95	..	..
2,289,909	1	—	—	—	Primitiva Ord.	11/—12/-	..	11/—11/6
302,600	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	82—84	..	83½—84
600,000	Stk.	Jan. 21	4	4	Do. 4 p.c. Red. Deb. 1911	65—67	+1	65—67
193,744	,,	Dec. 17	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	66—66½
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7⅞—8½	..	..
125,000	50	Jan. 4	5	5	Do. 5 p.c. Red. Deb.	43—46	..	44½
270,000	Stk.	Aug. 27	5⅝	5½	Sheffield A	100—102*e*	..	..
419,968	,,	,,	5⅝	5½	Do. B	100—102*e*	..	..
1,047,000	,,	,,	5⅝	5½	Do. C	100—102*e*	..	..
90,000	10	June 11	6	4	South African	5—7	..	..
6,609,895	Stk.	Aug. 13	6½	5	South Met. Ord.	93—95	..	93—94½
1,895,445	,,	Jan. 7	3	3	Do. 3 p.c. Deb.	56—59	..	57½—58
734,000	,,	Sept. 10	6½	6½	Do. 6½ p.c. Red. Db.	104—106	..	..
91,500	,,	Aug. 13	8½	8½	South Shields Con.	124—126*d*	..	..
1,187,795	,,	July 23	6½	6½	South Suburban Ord. 5 p.c.	97—101	+½	97
368,837	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	94—97	..	94½
647,740	,,	Oct. 22	5	5	South'mpton Ord. 5 p.c. max.	78—81	..	..
121,275	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	69—74	..	..
250,000	,,	Aug. 27	7	7	Swansea 7 p.c. Red. Pref.	102—104	..	..
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	Feb. 18	7½	7½	Tottenham District A 5 p.c.	107—112*	..	..
882,275	,,	,,	5⅝	5½	Do. B 3½ p.c.	86—91*	..	88—89
150,000	,,	,,	28/4	5½	Do. 5½ p.c. Pref.	101—103*	..	..
181,255	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	74—77	..	74
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New	69-70*d*	..	..
197,294	,,	Aug. 27	6⅞	6⅞	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	94⅜
88,330	,,	,,	5	5	Do. 5 p.c. pref.	88—93	−2	..
91,800	,,	,,	6⅞	6⅞	Do. 5 p.c. Maidenh'd	88—93	..	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 9	9½	8½	Wandsworth A 5 p.c.	128—133	..	..
255,636	,,	,,	7⅝	7	Do. B 3½ p.c.	109—114	..	..
412,450	,,	,,	6/9/6	5/19/0	Do. C and New	92—97	..	..
352,000	,,	,,	7⅞	6⅝	Wimbledon 5 p.c.	100—105	..	100
96,000	,,	,,	7⅞	7⅞	Epsom 5 p.c.	113—118	..	..
88,416	,,	Jan. 7	3	3	3 p.c. Deb.	55—58	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *Ex. div.

On Monday, Alliance and Dublin 69½, 70⅝, Gas Light and Coke 79½, 79⅝, 79¾, 80 *ex* div., 4 p.ct. preference 75¼ *ex* div., 3 p.ct. debenture 59½, Imperial Continental 137, 138½, Montevideo 72, Primitiva 11s. 4½d., 4 p.ct. 1st debentures 83¾, 84, 4 p.ct. (River Plate) debenture 66, 66½, San Paulo 5 p.ct. debentures 44½, South Metropolitan 93½, 93⅝, 3 p.ct. debenture 57¾. Supplementary prices, Barnet "A" 141½, 142½, "D" 102, 102½, South Suburban 7 p.ct. debenture 102½.

On Tuesday, Commercial 3 p.ct debenture 56½, Continental Union 34, 34½, European 6, Gas Light and Coke 79½, 79⅝, 79¾ *ex* div., 3½ p.ct. maximum 58½ *ex* div., 4 p.ct. preference 77 *ex* div., Hornsey 132, 133, Imperial Continental 137, 3½ p.ct. debenture 69½, 70, Primitiva 11s. 3d., 11s. 4½d., 4 p.ct. 1st debentures 83⅜, 84, South Metropolitan 93, 93½, 94½, South Suburban 97. Supplementary prices, Newport (Mon.) 5 p.ct. debentures 86.

On Wednesday, Gas Light and Coke 79, 79½, 79⅝, 79⅞ *ex* div., 3½ p.ct .maximum 59½, 59⅝ *ex* div., 3 p.ct. debenture 58½, Imperial Continental 136½, 137, 137½, 138½, Primitiva 11s. 3d., 11s. 6d., South Metropolitan 93½, 3 p.ct. debenture 57¾, 58, South Suburban 5 p.ct. 97, Tottenham 4 p.ct. debenture 74, Uxbridge 5 p.ct. 94¾, Wandsworth (Wimbledon stock) 100. Supplementary prices, Metropolitan Gas (Melbourne) 8⅛, South Suburban 7 p.ct debenture 103½, Tunbridge Wells 7 p.ct. debenture 100, 100½.

On Thursday, Aldershot 75, 76, Alliance and Dublin 69½, Bombay 18s. 9d., Bournemouth "B" 12⅜, Continental Union 33, Gas Light and Coke 79⅛, 79⅛, 79¼, 79½, 79⅝, 79¾ *ex* div., 4 p.ct. preference 75, 75¼ *ex* div., 3 p.ct. debenture 59¼, Imperial Continental 137, Lea Bridge 99, 99½, Malta and Mediterranean 4⅛, 5, Montevideo 71½, 72, Primitiva 4 p.ct. debenture (1911) 65, 67, South Metropolitan 93, 93⅜, South Suburban 97, 5 p.ct. debenture 94½. Supplementary prices, Bournemouth New "B" 12⅛, Colonial 23s. 3d., Hong Kong and China 5 p.ct. mort. debenture 87½.

On Friday, Aldershot "C" 75, 76, Alliance and Dublin 4 p.ct. debenture 58½, British 103½, Commercial 4 p.ct. 82, Gas Light and Coke 78¾, 79, 79⅛, 79¼ *ex* div., 3½ p.ct. maximum 58½ *ex* div., 3 p.ct. debenture 58⅝, 59¼, Hong Kong and China 20½, Primitiva 11s., 11s. 3d., 4 p.ct. debentures 83½, 83⅝, 84, South Metropolitan 93½, 93⅜, 93⅝, 94, South Suburban 5 p.ct. debenture 94½, Tottenham "B" 88, 88½, 89 *ex* div., 4 p.ct. debenture 74. Supplementary prices, South Suburban 7 p.ct. debenture 103½, 103½, Tottenham 5 p.ct. preference 85.

In spite of the payment of calls on the Queensland Government Stock, conditions were easy in Lombard Street at the end of the week; 4 p.ct. being the general rate for both old and new money. At the close balances were available at 3¾ p.ct. The distribution on Monday of the dividends on Victory Bonds and other Government Stocks will, it is anticipated, ensure a plentiful supply of money during the current week. Discount business was quiet, and rates were a trifle firmer as a result of the drop in the sterling exchange. The Treasury Bill rate averaged a little over 3⅛d. p.ct. cheaper at £4 2s. 3·12d. p.ct., but all the Bills offered were not allotted.

Optimism in some quarters with regard to the political outlook in France brought about a sharp recovery in the franc, which, however, is still quoted 131.70. Belgian francs were slightly cheaper at 107; but Italian lire remained steady at 120.95. Sterling on New York closed at 4.86 $\frac{3}{32}$.

Silver was weak on Chinese sales at 30$\frac{9}{16}$d. per oz.; but Gold remained at the nominal price of 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3½ p.ct. at notice.

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